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CE FLNG LLC

www.ceg-ltd.com

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

May 16, 2013

Re: CE FLNG, LLC PF13-11-000
CE FLNG LNG Project
Draft Resource Reports 1 and 10

Dear Secretary Bose:

On April 16, 2013, the Commission issued an Approval of the Pre-Filing Process Request for CE FLNG, LLC's ("CE FLNG") proposed CE FLNG LNG Project and the associated National Environmental Policy Act (NEPA) review process, as filed under the above-referenced docket.

Pursuant to 18 C.F.R. § 157.21(f)(5) of the Commission's regulations, CE FLNG hereby submits preliminary drafts of Resource Report 1, including a landowner mailing list, and Resource Report 10.

CE FLNG is submitting both a Public Version and a Confidential Version of Resource Report 1. CE FLNG requests that the Commission deem the information in the Confidential Version of Appendix 1-B of Resource Report 1, which includes landowner information, to be privileged and confidential in accordance with 18 C.F.R. § 388.112.

If you have any questions, please do not hesitate to contact me at jmann@cambridgeenergyllc.com.

Best regards,

/s/ Justin S. Mann

Justin S. Mann

Counsel for CE FLNG, LLC

Cambridge Energy

CE FLNG LNG Project

Docket No. PF13-11-000

Resource Report 1 – General Project Description

Draft Filing

May 2013

CE FLNG PROJECT
RESOURCE REPORT 1 – GENERAL PROJECT DESCRIPTION

Resource Report 1 Filing Requirements	
Information	**Location in Resource Report**
Minimum Filing Requirements	
1. Provide a detailed description and location map of the jurisdictional facilities. (§ 380.12(c)(1)) • Include all pipeline and aboveground facilities. • Include support areas for construction or operation. • Identify facilities to be abandoned.	Section 1.3
2. Describe any non-jurisdictional facilities that would be built in association with the project. (§ 380.12(c)(2)) • Include auxiliary facilities (see § 2.55(a)). • Describe the relationship to the jurisdictional facilities. • Include ownership, land requirements, gas consumption, megawatt size, construction status, and an update of the latest status of Federal, state, and local permits/approvals. • Include the length and diameter of any interconnecting pipeline. • Apply the four-factor test to each facility (see § 380.12(c)(2)(ii)).	Section 1.11
3. Provide current original U.S. Geological Survey (USGS) 7.5-minute series topographic maps with mileposts showing the project facilities. (§ 380.12(c)(3)) • Maps of equivalent detail are acceptable if legible (check with staff). • Show locations of all linear project elements, and label them. • Show locations of all significant aboveground facilities, and label them.	Appendix 1-A
4. Provide aerial images or photographs or alignment sheets based on these sources with mileposts showing the project facilities. (§ 380.12(c)(3)) • No more than 1-year old. • Scale no smaller than 1:6,000.	Will be provided in final Resource Report 1
5. Provide plot/site plans of compressor stations showing the location of the nearest noise-sensitive areas (NSA) within 1 mile. (§ 380.12(c)(3,4)) • Scale no smaller than 1:3,600. • Show reference to topographic maps and aerial alignments provided	Will be provided with final Resource Report 1
6. Describe construction and restoration methods. (§ 380.12(c)(6)) • Include this information by milepost. • Make sure this is provided for offshore construction as well. For the offshore construction this information is needed on a mile-by-mile basis and will require completion of geophysical and other surveys before	Section 1.5
7. Identify the permits required for construction across surface waters. (§ 380.12(c)(9)) • Include the status of all permits. • For construction in the federal offshore area be sure to include consultation with the MMS. File with the MMS for rights-of-way grants at the same time or before you file with the FERC.	Section 1.9
8. Provide the names and address of all affected landowners and certify that all affected landowners will be notified as required in § 157.6(d). (§ 380.12(c)(10)) • Affected landowners are defined in § 157.6(d). • Provide an electronic copy directly to the environmental staff.	Section 1.10, Appendix 1-B

Resource Report 1 Filing Requirements	
Information	**Location in Resource Report**
Additional Information Often Missing and Resulting in Data Requests	
Describe all authorizations required to complete the proposed action and the status of applications for such authorizations.	Section 1.9
Provide plot/site plans of all other aboveground facilities that are not completely within the right-of-way.	Will be provided with final Resource Report 1
Provide detailed typical construction right-of-way cross-section diagrams showing information such as widths and relative locations of existing rights-of-way, new permanent right-of-way, and temporary construction right-of-way. See Resource Report 8.	Will be provided with final Resource Report 1
Summarize the total acreage of land affected by construction and operation of the project.	Section 1.4
If Resource Report 5, Socioeconomics, is not provided, provide the start and end dates of construction, the number of pipeline spreads that would be used, and the workforce per spread.	Provided in Resource Report 5
Send two (2) additional copies of topographic maps and aerial images/photographs directly to the environmental staff of the Office of Energy Projects (OEP).	Will be provided with final Resource Report 1 under separate cover

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

°	degrees
%	percent
ABS	American Bureau of Shipping
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
Bcf/d	billion cubic feet per day
BMPs	best management practices
BOG	boil-off gas
BWMS	ballast water management system
CE	CE FLNG, LLC and CE Pipeline, LLC, collectively
CE FLNG	CE FLNG, LLC
CEP	CE Pipeline, LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGT	Columbia Gulf Transmission
COTP	Captain of the Port
CO_2	carbon dioxide
DFS	Dual Fuel Systems
DOE	Department of Energy
DOT	Department of Transportation
EEZ	Exclusive Economic Zones
EI	Environmental Inspector
EIA	Energy Information Administration
EEZ	Exclusive Economic Zones
ESA	Endangered Species Act
F	Fahrenheit
FEED	front end engineering and design
FERC	Federal Energy Regulatory Commission
FLNG	floating liquefied natural gas
Formosa	Formosa Plastics Corp.
FTA	Free Trade Agreement
Gulf	Gulf of Mexico
GTG	gas turbine generators
HPGT	High Point Gas Transmission
HDD	horizontal directional drill
IHI	Ishikawajima-Harima Heavy Industries Co Ltd
IMO	International Maritime Organization
Kw	killowatt
LDEQ	Louisiana Department of Environmental Quality
LNG	liquefied natural gas
LNGC	liquefied natural gas carrier
LPG	liquefied petroleum gas
m^3	cubic meter
Maintenance Plan Port	CE FLNG LNG Facility
MAOP	Maximum Allowable Operating Pressure
MLLW	mean low low water
MLT	mean low tide

MMSCD	million standard cubic feet per day
MP	milepost
MS	Mooring Structure
MTPA	million tons per annum
MW	megawatt
NFPA	National Fire Protection Association
NGA	Natural Gas Act
NGL	natural gas liquids
nmi	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
OCIMF	Oil Companies International Marine Forum
OSHA	Occupational Safety and Health Administration
pipeline	pipeline header system
Plan	FERC staff's Upland Erosion Control, Revegetation and
Procedures	FERC staff's Wetland and Waterbody Construction and Mitigation
Procedures Project	CE FLNG LNG Project
psi	pounds per square inch
ROS	Reduced Operating Status
SBP	Self-supporting Prismatic shape IMO type-B
SBS	side-by-side
SCR	selective catalytic reduction
South Korea	Republic of South Korea
SO_x	sulfur oxide
SPCCP	Spill Prevention, Control, and Countermeasures Plan
SWPPP	Stormwater Pollution Prevention Plan
U.S.	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDOT	U.S. Department of Transportation
UV	ultraviolet
VTC	Vessel Traffic Center
WSA	Waterway Suitability Assessment
WSR	Waterway Suitability Report

1.0 INTRODUCTION

CE FLNG, LLC (CE FLNG) and CE Pipeline, LLC (CEP) (herein after referred to as CE) are proposing to develop, construct, and operate the CE FLNG Project (Project). The Project would include liquefied natural gas (LNG) terminal facilities to be located on a parcel of land near Baptiste Collette Bayou in Plaquemines Parish, Louisiana, on the eastern bank of the Mississippi River between Mile Markers 11.8 and 13.5 (Port), and an approximately 37-mile-long, 42-inch-diameter pipeline header system (pipeline) to transport natural gas from existing pipeline systems to the LNG terminal facilities. CE has secured an option to lease the parcel of land from a private landowner, which would give CE control over the entire land area required for construction and operation of the LNG terminal facilities, as well as the associated safety exclusion zone. The Project would require improvement dredging of the existing Mississippi River to accommodate delivery of two purpose-built floating liquefied natural gas (FLNG) vessels, FLNG Vessel 1 and Vessel 2, and new dredging to create a berth for the FLNG vessels and a berth and turning basin for traditional LNG carriers (LNGCs). The FLNG vessels would pre-treat, liquefy, store, and offload LNG. The portion of the Project that includes LNG terminal facilities would be constructed and operated pursuant to Section 3 of the Natural Gas Act (NGA), while the natural gas pipeline would be constructed and operated pursuant to Section 7 of the NGA. The CE Pipeline will operate as a non open access pipeline with the sole purpose of collecting natural gas from delivery points on interstate pipelines at interconnection points located along the CE pipeline route and will transport the natural gas to the LNG terminal for further processing and transport via LNG carriers. The natural gas to be transported on the CE Pipeline will be owned by CE FLNG and/or its affiliate, Cambridge Energy LLC.

Off-taking liquefied natural gas carriers (LNGCs) would traverse the Mississippi River from the Gulf of Mexico through the Mississippi River's Southwest Pass. The route from the Southwest Pass starts at the mouth, then follows the Mississippi River in a northerly direction. The Project would be constructed in two phases. The first phase would include construction of the pipeline and Marine Terminal between 2015 and 2017. The second phase would include construction and installation of Mooring system and installation of the FLNG Vessels between 2015 and March 2018.

CE FLNG anticipates that the FLNG Vessel 1 and FLNG Vessel 2 would be in service by the end of March 2018 and October 2018, respectively. Each FLNG Vessel is being design to produce 4 million tons per annum (MTPA) for export. The first phase would also include construction of the marine facilities required for both FLNG vessels 1 and 2, construction of the pipeline and appurtenant facilities, deepening of the Mississippi River at the entry of the LNG Terminal, and dredging of the berthing pocket and turning basin. The installation of FLNG Vessel 2 would double the production to 8 MTPA. CE will include impacts for both phases in preparation of the resource reports. The FLNG vessels would look like a marine vessel and could remain moored in place for the 20-year duration of the project, The FLNG vessels would be approximately 1,100 feet long and up to 180 feet wide, with a design draft of approximately 36 feet and the upper deck extending up to 82 feet above the waterline. The Mooring Structure (MS) would allow the FLNG vessels be disconnected within 24 hours of a significant weather event and be reconnected after the event has passed.

This Resource Report 1, along with Resource Reports 2 through 13, will collectively make up the Environmental Report to be submitted as part of CE's NGA Section 3 and Section 7 applications to the FERC.

1.1 PURPOSE AND NEED

The CE FLNG LNG Project is being proposed as a result of the continued improved outlook for domestic natural gas production, owing to drilling productivity gains that have enabled rapid growth in supplies from gas-bearing formations in the United States (U.S.). Improvements in drilling and extraction technologies have coincided with rapid diffusion in the natural gas industry's understanding of the resource base and best practices in drilling and resource development. These changes have rendered obsolete once prominent fears of declining future domestic natural gas production. Increased estimates of technically recoverable natural gas in the U.S. reached a record 2,384 trillion cubic feet at the end of 2012 (Colorado School of Mines 2013). Improved drilling and extraction technologies allowing for natural gas production from unconventional gas-bearing formations has primarily driven the increase in these estimates. In 2012, the U.S. consumed approximately 25.5 trillion cubic feet of natural gas (Energy Information Administration [EIA] 2013). Therefore, according to the EIA, there is estimated to be enough recoverable natural gas in the U.S. to supply the U.S. for over 100 years at current consumption levels (EIA 2013).

The purpose of the CE FLNG LNG Project is to provide additional LNG export capacity. The need for the Project is to allow for the export of natural gas as LNG, providing a market solution to allow the further deliberate development of these sources of domestic natural gas and resulting in the following benefits, all of which are consistent with the public interest:

- At the request of the U.S. Department of Energy (DOE), Office of Fossil Energy, and as recorded in Macroeconomic Impacts of LNG Exports from the United States (2012)[2], NERA Economic Consulting examined the economic impacts of different limits on LNG exports ranging from zero to unlimited. According to NERA, in all of the scenarios *"the U.S. was projected to gain net economic benefits from allowing LNG exports. Moreover, for every one of the market scenarios examined, net economic benefits increased as the level of LNG exports increased."*
- Will stimulate the local economy (as it has been devastated by Hurricanes Katrina, Rita, and Isaac) and the Louisiana state, regional, and National economies through job creation, increased economic activity, and tax revenues, including the direct creation of approximately 1,000 engineering and construction jobs during the course of the project and, indirectly, approximately 470 permanent jobs directly supporting the project..
- Further, the President's National Export Initiative, by improving U.S. balance of payments through the exportation of approximately 1.0 billion cubic feet per day (Bcf/d) of natural gas valued at approximately $3.75 billion and the displacement of $1.3 billion in natural gas liquids (NGL) imports.
- Raise domestic natural gas productive capacity and promote stability in domestic natural gas pricing.
- Promote liberalization of global natural gas trade through fostering of a global, liquid, natural gas market.
- Advance National security and the security of U.S. allies through diversification of global natural gas supplies.
- Increase economic trade and ties with foreign nations including neighboring countries in the Americas and displacing environmentally damaging fuels in those countries.

On November 21, 2012, CE received authorization from the Office of Fossil Energy of the DOE to export LNG from domestic source to "any nation with which the United States currently has, or in the future will have, a Free Trade Agreement (FTA) requiring the national treatment for trade in natural gas, and that currently has, or in the future develops, the capacity to import the LNG via ocean-going carriers" (DOE/FE Order Number 3193). CE was granted long-term, multi-contract authorization to export up to eight MTPA for a 30-year term commencing on the earlier of the date of first export or 10 years from the date of authorization (November 21, 2022).

1.2 PROPOSED FACILITIES

The proposed LNG terminal would be located off the east bank of the Mississippi River near Baptist Collete Bayou, approximately 11 miles from the Head of the Passes, as shown in Figure 1-1. LNG would be produced on the FLNG terminal, stored on the FLNG vessels, and transferred to LNG carriers The Project would also include a new natural gas pipeline with the sole purpose of delivering natural gas to the FLNG Terminal (see Figure 1-1) The Project would consist of three main components: 1) the marine facilities, including the two FLNG vessels and the widening and deepening of the channel; 2) the onshore facilities; and 3) the pipeline. Details of each project component are described below.

1.2.1 Marine Facilities

The marine facilities would consist of the following:

- Two FLNG vessels
- New turning basin and berthing pockets adjacent to the existing navigation channel of the Mississippi River
- Jetty
- Mooring structures
- A deepened Mississippi River connecting to the turning basin

FLNG Vessels

The two FLNG vessels (FLNG 1 and 2), both in appearance and design, would be self-propelled, resemble a marine vessel, and remain moored, but would have the capability of disconnecting in the event of a significant weather event. Each FLNG vessel would measure approximately 1,100 feet in length and up to 180 feet in width, and would rise approximately 80 feet above the water line to the deck. The FLNG vessel's deadweight would be approximately 171,000 tons and the full load displacement will be 282,000 tons.

The FLNG vessels would be ship-shaped, double-sided, double-bottom, double-hulled with a large freeboard Within the hull of each vessel, there would be ten LNG storage tanks with a liquid containment system as originally developed by the Japanese shipyard Ishikawajima-Harima Heavy Industries Co Ltd (IHI) and subsequently used for LNG carriers trading in very harsh environments between Alaska and Japan. The FLNG vessels are equipped with the self-supporting prismatic shape IMO type-B (SPB) containment system which enables the vessel to operate with partially filled tanks at sea without the risk of causing any damage due to sloshing. This is crucial because an offshore LNG production facility will always have various levels of LNG in its tanks. When the tanks are not full, the motion of the facility caused by the wind and waves result in the cargo moving within the tanks. These movements (sloshing) can severely damage the containment system of a membrane ship. These types of ships have operated with a very good track record. The SPB technology has also successfully

Figure 1-1. Vicinity Map

GSRC

May 2013

been applied for LPG and Condensate FSO/FPSOs. The storage tanks would be laid out ten tanks long by two tanks wide, with a nominal capacity of 25,500 cubic meters (m^3) each, making the total storage per FLNG vessel of 250,000 m^3.

The FLNG vessels would license the PRICO Technology from Black & Veatch using a Single Mix Refrigerant Process and Utility components located on the FLNG vessel. Liquefaction would be provided using four, one MTPA PRICO system trains on each FLNG vessel. Refrigerant compressors drivers would be powered by Trent 60 Gas Turbine Drivers (approximately 50-megawatt [MW] each at 22 degrees [^{0}] Celsius) and Dresser Rand Datum Centrifugal Compressors (two-stage, single body), each forming a self-contained LNG production and storage facility. The four liquefaction trains would be arranged in a 2 x 2 parallel LNG liquefaction module arrangement. LNG-related equipment for managing boil-off and gas-freeing liquid tanks would also be contained on each FLNG vessel.

The FLNG vessels would be self-propelled and capable of moving without the assistance of tugs. The FLNG vessels would be temporarily moored to the shore utilizing a mooring system. This would allow the FLNG vessels to transit from their berths in case of severe weather conditions. The site-specific met-ocean study for CE FLNG is included in Resource Report 13. This met-ocean study would be conducted in the front end engineering and design (FEED) of the mooring system and civil/structural design for the LNG terminal facilities. Sloshing modeling using Santos Basin met-ocean conditions, which exceed conditions found in the site-specific met-ocean study, would be conducted during detailed design.

Electrical power for FLNG vessel operations would be provided onboard. The FLNG vessels' electrical system will be capable of supplying all FLNG vessel-based processes, utilities, marine (onboard) habitability, and safety systems to enable the liquefaction process to be carried out. An accommodation module, capable of housing up to 60 personnel, would be included onboard. Once emplaced at the terminal, the self-sufficiency of the FLNG vessels would enable the FLNG vessels to remain at the berth unless requiring movement for a significant weather event.

Feed Gas Pre-Treatment

The gas pre-treatment would be in a 2 x 1 gas treatment module arrangement (2 percent [%] to 50%). The inlet gas flow rate is expected to be 610 million standard cubic feet per day (MMSCD) for each FLNG vessel.

Amine System

An amine system would be located onboard to remove carbon dioxide and hydrogen sulfide from the feed gas. The amine system would include a thermal oxidizer to incinerate reduced sulfurs. The system would include two identical amine modules each capable of treating 305 MMSCFD (2% to 50%).

Dehydration

Although the pipeline quality feed gas would already have been dehydrated to low levels, there may be residual water content unsuitable for processing in a liquefaction process. To effectively reduce the water content to zero, further dehydration would be carried out downstream of the amine system. This dehydration system would utilize molecular sieve adsorbent to remove water and be regenerated using treated feed gas. The saturated regeneration gas would be cooled to condense the water component, separated, recompressed, and recycled back to the amine unit inlet. The dehydrated feed gas would

pass through a mercury removal bed and then be routed to the FLNG vessel via process flow meters for heavies removal and liquefaction. The system would consist of two 50% dehydration units located on one module. Each unit is equipped with three dehydration beds, one mercury guard, and four dust filters.

Condensate Storage
Hydrocarbon condensate would be produced in the FLNG vessels and stored in a hydrocarbon storage tank on the FLNG vessels. At regular intervals, the condensate from the storage tank would be offloaded to tankers to control the inventory in the storage tank. Preliminary sizing for condensate storage is included within Resource Report 13.

Tank Pumps
The FLNG vessels would have three types of tank pumps: LNG cargo pumps, LNG spray/stripping pumps, and emergency LNG pumps. The tanks are fitted with a tank dome on top. Cargo pumps and stripping/spray pumps are fitted in the bottom of the tanks. Tank pressure ranges from -7 kilopascal to 25 kilopascal gauge.

On each FLNG vessel there would be a total of 20 LNG cargo pumps of the centrifugal-submerged type driven by integral electric motors.

The LNG spray/stripping pumps would be used to:

- Spray LNG in the LNG storage tank for cooling down after gas freeing operation and after inspections of tanks;
- Maintain temperature of an empty LNG storage tank or cool down after natural warming; and
- Strip the LNG storage tank

On each FLNG vessel, there would be 10 of these spray/stripping pumps and they would also be of the centrifugal-submerged type driven by integral electric motors. There would be three sets of emergency LNG pumps stored in readiness for use. They would be capable of being handled through the top of the LNG storage tank without opening the tanks. These pumps would be driven by electric motor.

Vapor Return Blowers
The vapor return blowers would be centrifugal-type, motor-driven, high-duty compressors. There would be two sets of compressors (one in operation and one on standby) installed in the cargo machinery room of each FLNG vessel. The vapor return blower would be used to:

- Transfer generated vapor to the LNGC during gas trial when loading LNG or during initial cooling down of the vessel; and
- Recirculate hot LNG vapor to warm up the LNG storage tank during gas freeing operation.

Boil-Off Gas Compressors
There would be four Burckhardt Laby 3-Stage Compressors and one dry gas sealed, cryogenic reciprocating compressor, each capable of handling 15 MMSCFD. Two compressors would be required during normal operations, and two compressors would be required for additional boil-off gas (BOG) during cargo transfer. Additionally, two regeneration gas high pressure BOG centrifugal compressors (Sundyne or equivalent) supplying high pressure fuel gas

for liquefaction gas turbines, and three medium pressure screw compressors supplying medium pressure fuel for gas turbine generators (GTGs) would be required. Excess BOG would be recycled to the front end of dehydration units.

Fired Heaters
There would be no fired heaters on the FLNG vessels.

Instrument Air Packages
Instrument air (control air) would be provided on each FLNG vessel by two electrically driven screw-type compressors. These control-air compressors would be fresh water-cooled and located in the forward machinery space. Control air from the compressors would be fed to two control air reservoirs. Three control air dryers (adsorption type) would be provided for removing the moisture in the control air system.

Plant Air
Plant air (general air) would be provided on each FLNG vessel by an electrically driven, screw-type compressor. This general service air compressor would be fresh water-cooled and supply air to one forward general service air reservoir and one aft A shut-off valve would be provided at each air distribution group in the forward, aft, and cargo machinery spaces. Hose connection valves would be fitted for general service usage in all spaces.

Nitrogen Packages
Two membrane-type nitrogen generation packages would be used to purge pipelines and equipment during preparation, for sealing compressors, and for using as refrigerant

Cooling Water Equipment
Cooling utilities necessary to support the installation of the 4 MPTA topside would be on each FLNG vessel.

Power Generation, Propulsion, and Supply Equipment
The FLNG Vessel would have a transit speed of 12 knots. The propulsion system would consist of an Arizod Pod Propulsion System powered by a liquefaction power supply system when it is not in use, and primarily running natural gas as the energy source. During the loaded and the ballast voyage, the power plant onboard the FLNG vessels services the propulsion load, the service load and the hotel load of the vessel. In the harbor, the power plant services the load required for the cargo operations, as well as the living quarters load and other consumers. The multiple engine arrangement allows the power management system (PMS) to start up or shut down engines to match power generation and power consumption. The FLNG vessels would have three Wärtsilä 12V50DF and one 6L50DF dual fuel natural gas engine driving generators to provide about 38.5 MW of electric power (two operating and one spare). This configuration allows the small generator to be off-line when sailing fully loaded. Depending on the vessels' schedule and the vessels' speed- power curve it might be possible to temporarily take one large engine off-line for maintenance during the ballast voyage. When loading, the small generator should be able to generate sufficient power to service entire FLNG terminal. When off-loading, one large generator would be required. When operating in gas mode, the nitrogen oxide (NO_x) emissions are at least 85% below those specified in the current IMO regulations, and carbon dioxide (CO_2) emissions are approximately 25% less than those of a conventional marine engine running on diesel fuel. Additionally, the sulphur oxide (SO_x) and particle emissions are negligible at almost 0%. Waste heat recovery units would also be utilized to generate steam. The amine reboiler and direct heater coil would be utilized for regeneration. The emergency

generation and essential generator are located in the hull. Heavy liquids would be vaporized and consumed by gas turbines as fuel gas.

Vent Stacks or Flares
The FLNG vessel would include an elevated cold vent with a high velocity tip to aid dispersion and one elevated flare tower containing two flares, one warm and one cold.

Firewater Systems
Each of the FLNG vessels would have two electric-driven and two diesel engine-driven fire pumps Firewater would be supplied from the surrounding bay through sea chests on each FLNG vessel.

Other Process or Auxiliary Equipment and Structures
The following would also be present on each of the FLNG vessels:

- Inert gas
- Distilled water
- Potable water
- Hot oil
- Oily water/effluent treatment
- Closed/open drains

1.2.2 Primary Support Facilities and Systems

The primary support equipment, facilities, and systems on the FLNG terminal would include the associated selective catalytic reduction (SCR) systems, recondensers and boil-off gas compressors, metering and odorization equipment and systems, an emergency flare, a ballast system, a utilities/seawater system, waste and water treatment systems, and crew quarters and command control facilities. The glycol/water system, in addition to being used in the vaporization system, would be used to cool the FLNG terminal's machinery and equipment. Information on these systems is presented below, and Figure 1-2 illustrates the height above the water line for the primary equipment and facilities that would be installed on the deck.

Ballast Water System

CE intends to use the Wärtsilä AQUARIUS® UV ballast water management system (BWMS), which provides robust technology for the treatment of ballast water using ultraviolet (UV) irradiation, across the full range of ship operating and environmental conditions. The Wärtsilä AQUARIUS® UV BWMS is a simple two-stage process involving filtration and UV irradiation. During uptake, seawater or river water is first passed through a 40-micron backwashing screen to remove particulate, sediment, zooplankton, and phytoplankton. Disinfection of the filtered sea or river water is then carried out using medium pressure UV lamps and controlled by the BWMS control system. Upon discharge, the filter is bypassed, but the ballast water is again disinfected with UV treatment before safe discharge back into the sea or river. The maximum seawater temperature rise is estimated to be 15^0 Fahrenheit (F).

There would also be two firewater pump intakes on the FLNG, one on the forward end and the other on the aft end.

Figure 1-2. Primary Support Facilities and Systems
To be Provided with Final

Utilities

Cooling Seawater/Freshwater System

In addition to use in the ballast system, seawater/freshwater would be used for routine and emergency situations, including the following:

- Potable water would be generated using a desalination plant (reverse osmosis unit); two pumps would be available, with only one pump in operation at any time.
- General service pumps to provide a water curtain for the LNG loading area.
- Inert gas scrubber cooling pump for occasional use when storage tank inerting (purging with inert gas) or aerating would be required.
- Seawater cooling pump for emergency use to cool the equipment on the FLNG terminal if the glycol/water system fails.
- Firewater system to provide firefighting water in the event of a fire; this system would be used only in an emergency and during monthly system tests.

The cooling seawater and freshwater system specific components include:

- Topside cooling S.W. pump: 4,900 m^3/h x 10 sets (four working, one standby, in AFT and FWD)
- Topside cooling F.W. pump: 2,300 m^3/h x 10 sets (four working, one standby, in AFT and FWD)
- Topside cooling plate cooler: 10 sets (four working, one standby, in AFT and FWD)
- Auxiliary cooling S.W. pump: four sets (one working, one standby, in AFT and FWD)
- Auxiliary cooling F.W. pump: four sets (one working, one standby, in AFT and FWD)
- Auxiliary cooling plate cooler: six sets (two working, one standby, in AFT and FWD)

Seawater for routine uses of the seawater utility system would be taken in through the intake system. Seawater for the firefighting water system would be taken in through dedicated intake structures located in the fore and aft sections of the FLNG vessels. The firewater intake structures would be identical to the sea chest intakes, excluding the 0 2-inch mesh screen.

Sanitary Wastewater

Sanitary wastewater would be collected and routed to a holding tank. CE is proposing to treat wastewater generated on the FLNG terminal using a membrane bioreactor system, then discharge approximately 2,000 to 5,000 gallons per day of treated wastewater overboard. Wastewater would be discharged only if it met water quality discharge standards as established by the Louisiana Department of Environmental Quality (LDEQ). If LDEQ standards could not be met, wastewater would be containerized and sent to an approved onshore disposal site.

Stormwater Handling and Pollution Prevention

Collection, treatment, and discharge of stormwater would vary with location on the FLNG terminal. Uncontaminated stormwater runoff, as well as firewater system test water, would be directed overboard via scupper drains. Stormwater that collects in the vicinity of equipment that could release oil or oil-like substances and other chemicals would be collected with curbs and gutters and routed to a holding tank, brought to shore, and disposed of at an approved facility. The likelihood that stormwater would be contaminated by hazardous materials onboard the FLNG terminal would be minimized through the use of best management practices (BMPs). BMPs would include proper containment, storage, and handling of hazardous materials; regular inspections; and spill prevention practices.

Odorant

To aid in the detection of leaks, odorant would be added to natural gas in order to give it a perceptible odor, even at low concentrations. The odorant used would be commercially available and would be stored and handled in accordance with the manufacturer's recommendations. CE has not yet committed to a particular odorant, but it almost certainly would be a mercaptan, likely ethyl mercaptan or t-butyl mercaptan. The shipment of these substances would be regulated by the U.S. Department of Transportation (DOT) as both flammable liquids and toxic substances (shipping Class I). Storage would be regulated by the U S. Occupational Safety and Health Administration (OSHA) 29 CFR 1910.106 The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) reportable quantity is 100 pounds. Odorant would be stored on the FLNG in two 6,000-gallon tanks installed within a spill containment system. Odorant spill prevention and cleanup measures would be addressed in the Project-specific Spill Prevention, Control, and Countermeasures Plan (SPCCP).

Crew Quarters

Living quarters on the FLNG terminal would accommodate a permanent crew of up to 60. Crew members would be transported to and from the FLNG terminal on small boats or tugs. For safety reasons, all living, dining, and recreational areas would be contained within the crew quarters and separated from all processing areas. A helideck, which would be for emergency transport only, would be located on top of the crew quarters.

Command and Control Facilities

Command and control facilities would be located in a central control room in the crew quarters area. These facilities would include control and monitoring systems for LNG and natural gas processing, ballasting, communications, radar equipment, electrical generation, emergency systems, and thruster controls.

Onshore Support Facilities

Onshore support facilities would be required for both construction and operation of the FLNG terminal. CE would use existing facilities in Louisiana and outside of the region, as described in the construction and operation portions of this Resources Report.

The FLNG vessels are being specifically designed with the ability to fit into a standard shipyard slot and would be constructed by Nantong Mingde Heavy Industries The FLNG vessels would undergo extensive testing in the shipyard with final commissioning activities completed on-site. A detailed description of equipment and structures on the FLNG vessel is provided in Resource Report 13. A summary of the main components on each of the FLNG vessels is described below.

1.2.3 LNG Storage and Containment

LNG would be stored in the SPB containment system, which enables the vessel to operate with partially filled tanks at sea without the risk of causing any damage due to sloshing. This is crucial because an offshore LNG production facility will always have various levels of LNG in its tanks. When the tanks are not full, the motion of the facility caused by the wind and waves results in the cargo moving within the tanks. The tanks would be incorporated into the hull of the structure, with a total net storage capacity of 250,000 m^3 (approximately 5.7 billion cubic feet of natural gas). The double hull of the FLNG vessels (on the bottom, the sides, and the deck above the cargo containment system) would effectively provide double-walled containment around the entire LNG storage system. Each storage tank would be separated by

cofferdams from adjacent storage tanks and from spaces fore and aft of the cargo region. Ten thermally insulated LNG storage tanks, each with a capacity of approximately 25,000 m^3, would maintain the stored LNG at a temperature of minus (-) 260^0 F and at or near atmospheric pressure (1 to 3 pounds per square inch [psi]). Each storage tank would be equipped with a retractable pump that would be used to transfer LNG. CE is currently proposing to use a design similar to the IHI SPM tank systems. Each of these LNG storage designs consists of the following three layers:

- The SPB cargo containment system uses a stiffened plate structure of either thick aluminum or 9% nickel steel to hold LNG. The thickness of LNG barrier is 25 to 30 millimeters (mm) compared to approximately 1 mm for a membrane system This design gives the tanks the same strength against inner and outer pressure, an advantage over the Moss and Membrane types, which are comparatively weak against outer pressure and require differential pressure control
- The tanks subdivide into four sections by a liquid-tight bulkhead. This means that the natural frequency of the cargo is very different from that of the motion of the ship, and so eliminates any chance of resonance between the cargo and the vessel. Sloshing is therefore not a problem, which allows for the partial loading of the vessel, making it ideal for applications such as floating production.
- The tank insulation, unlike the membrane system, does not need to bear liquid pressure on the tanks, and so the best insulating material can be chosen to minimize the boil-off rate.

Offloading and Operations

LNG would be discharged to an off-take vessel (LNGC) through either hard arms or hose. For benign environments, the LNG can be discharged in a side-by-side (SBS) configuration. For this configuration the shuttle LNG carrier is moored alongside the FLNG vessel and offshore marine loading arms are used to discharge the cargo to the standard midship manifold on the LNG carrier. LNG would be transferred at a rate of 10,000m^3 per hour. An important reason for choosing this configuration is that standard LNG carriers can be used to ship the cargo to the world market In case of a tandem offloading operation, the LNG carrier would need a bow loading arrangement, which would require it to be a dedicated LNG carrier. Moreover SBS is done on a daily basis for many other products and loading arms are well-proven equipment on LNG terminals, which provides a good basis to develop these for an offshore application.

The main equipment that would be installed on the FLNG terminal is the offshore marine loading arms, the SBS mooring system, and the fendering systems. Berthing assistance systems would also be used to support the approach, berthing, and departure of the LNGC. Both forecast and real-time wave, wind, and current measurements/predictions would be used to assist the crew in the planning of the entire off-take operation.

The FLNG terminal would be able to accommodate LNG carriers of both membrane and spherical type. The sizes could vary from 125,000 m^3 to 170,000 m^3. A mooring compatibility study would be required for vessels outside this range. The FLNG would have condensate storage in tanks forward and aft of the LNG cargo area. The condensate would be offloaded by a dedicated stern discharge system in a tandem configuration This equipment and its operation would be similar to existing operations on FPSOs. The offloading would be performed in a SBS configuration, done via loading arms on starboard side A standard carrier would be able to load from the FLNG terminal utilizing mooring equipment fitted on the FLNG terminal itself. The FLNG terminal would also be specially fitted to be able to receive any displaced

vapor-return and additional boil-off from the LNG carrier as its tanks are filled. A crew consisting of 60 persons would operate each FLNG vessel; however, an additional 40 persons would work various shifts. The total required for each FLNG vessel to operate is 100 persons. They would be transported to the FLNG terminal by crew boat from Venice, Louisiana LNG would be loaded on LNG carriers with cargo capacities ranging from 125,000 to 170,000 m^3. Two to three carriers per week would arrive at the FLNG terminal, with an anticipated average of 80 to 130 carriers per year.

A single carrier berth would be on the starboard side (right side if facing to the front [bow]) of the FLNG terminal, along with unloading arms and other LNG unloading equipment and facilities. Living quarters to accommodate 60 permanent during operators with adjustments being would be made (i.e., during commissioning, training, shutdowns, and maintenance) crew members would be included on the aft end (stern or rear) of the FLNG terminal. CE has indicated that final design and material specifications for the FLNG terminal would be determined in consultation with a ship classification society. Classification societies are organizations that develop and apply design, construction, and maintenance rules for ships and offshore structures

These rules apply to the strength and integrity of a vessel or the structure's hull and appendages, and the reliability of steering, power generation, and other systems needed to maintain essential services. Classification societies rely on the review and opinions of industry experts. Vessels and structures designed and constructed to the rules of a classification society may be issued a Certificate of Classification from that society, following a series of pre- and post-construction classification surveys to verify compliance with applicable rules.

Turning Basin and Berthing Pockets

A single turning basin would be dredged to provide safe turning for the arrival of the lightly ballasted FLNG vessels at Project startup and for the departure of fully loaded LNGCs during facility operation. The turning basin would be approximately 2,700 feet in diameter with a dredged depth of approximately -59 feet mean low tide (MLT), which is equal to approximately -60 feet mean low low water (MLLW). The diameter of the turning basin would be sufficiently large to accommodate turning of the LNGCs and initial installation of FLNG vessels. The turning basin would be located approximately equidistant from the two berthing pockets and service both berths. The approach areas between the turning basin and berthing pockets would be dredged to approximately -59 feet MLT (-60 feet MLLW) to facilitate unrestricted vessel movement to the berthing areas. Preliminary dredging volumes have been calculated during FEED. These preliminary volumes are included in Resource Report 13. Final volumes will be determined during the detailed design stage of the Project. Material from the dredging operation will be used as beneficial use material to create extended reclaimed wetlands.

A berthing pocket would be dredged beside each mooring station to accommodate the FLNG vessels and LNGC in a double-banked arrangement. Each of the berthing pockets will be approximately 450 feet wide by 1,312 feet long, dredged to a depth of approximately -59 feet MLT (-60 feet MLLW). The sides of the berthing pockets would be dredged to a stable slope of 1 to 3, with the exposed side on the station protected from erosion by anti-erosion matting. The dredged berthing pockets and berthing arrangement and size would allow an LNGC to smoothly maneuver in and out of the terminal during normal operations or in the event of an emergency.

Jetty

The total length of the marine facility or "jetty" for the Project is approximately 2,700 feet. The proposed jetty consists of a shoreline along the Mississippi River. The structure of the FLNG vessel berth would be well above storm surge and wave heights.

Mooring Structures

Each FLNG vessel would be moored in its own berthing pocket to the east of the turning basin, with bows facing south or south-southwest, into the prevailing wave and currents that may be experienced in a storm event. Each FLNG vessel would have a separate set of mooring structures and fenders. For FLNG vessel-to-ship transfer of LNG, the LNGC would be moored in a double banked arrangement, bows facing south, with all LNGC mooring lines attached to the FLNG vessel.

The mooring structures would be designed to provide support for both the FLNG vessel and LNGC in a double-banked arrangement up to Oil Companies International Marine Forum (OCIMF) wind, wave, and current release criteria. Above these guidelines the LNGC would be released to seek safe harbor. The moorings would also be designed to hold the FLNG vessel in position during all storm conditions but disconnect in significant weather events with wind velocities meeting the level of a Category 1 hurricane.

In addition to the fenders attached to the jetty, mooring structures, and equipment would consist of six sets of lines with 'dead man' moorings. Up to LNGC release conditions, two sets of mooring lines would be deployed at the bow and two sets of mooring lines at the stern of the FLNG vessels. For wind conditions above OCIMF release guidelines, the two remaining midships' storm mooring sets would be deployed.

Channel Dredging

The Mississippi River is currently maintained by the U.S. Army Corps of Engineers (USACE), New Orleans District, at a depth of -45 feet MLT, and has an average channel range width of the from 400 to 700 yards, and depths noted ranged from 50 feet on the inside bends to -190 feet on the outside bends of the river above Head of Passes (Figure 1-3). The -45 foot contours for the channel condition focus on the lower Mississippi River downstream of Venice. Upstream of Venice the width of the -45 foot channel averages 80% or more of the total top bank width of the river. Since vessels are normally discouraged from entering Southwest Pass when fog conditions develop, the Pilottown Anchorage is generally used as a refuge for outbound vessels. The Pilottown Anchorage is an area 5.2 nautical miles (nmi) in length, extending from Mile 1.5 to Mile 6.7. Southwest Pass has a recommended draft limit of 45 feet.

CE is currently working with the Plaquemines Parish Government regarding a permit to beneficially use the dredged material. CE would coordinate with Plaquemines Parish and USACE, New Orleans District, to dredge the riverfront of the proposed facility to -60 feet MLLW. The Project components are currently in the engineering and design phase. As soon as the permit is issued, the dredging would begin. This permit allows for the increase in the channel depth below -44 feet MLLW. The deepening and widening of the Mississippi River to these dimensions would result in approximately 210,600,000 million cubic feet of dredge material for construction and approximately 31,590,000 million cubic feet per year for maintenance dredging. The Project would seek to utilize the existing permit for dredging the riverfront to a depth of -59 feet (-60 feet MLLW). CE would apply for a new permit if necessary based on the Project dredging requirements. CE would provide documentation for all necessary USACE permits in its application to the FERC.

Figure 1-3. Mississippi River Navigation Channels

Preliminary dredging volumes are being calculated during FEED. These preliminary volumes are included in Resource Reports 2 and 13. Final volumes would be determined during the detailed design stage of the Project.

Waterway for LNG Marine Traffic

LNGCs arriving and departing from the FLNG terminal would use the Mississippi River. The proposed CE FLNG facility is to be constructed on the East Bank of the Mississippi River, between mile markers 11 0 and 13.0. LNGCs that transit to and from the FLNG terminal would follow a route through Southwest Pass This is virtually the same route as currently used by all deep-draft vessels servicing the Mississippi River bound for the Port of New Orleans and other ports on the Mississippi River. Currently 5,800 vessels transit the river each year LNGCs would enter from the Gulf of Mexico and would travel approximately 33 miles from the Gulf of Mexico to the proposed FLNG terminal.

There is no limit on deadweight tonnage for ships using Southwest Pass. A Federal project provides for a -45 foot channel over the bar and through Southwest Pass, to Head of Passes. The navigation channel is under constant maintenance dredging. The navigation channel further provides for a -45 feet channel from Head of Passes to New Orleans, thence -45 feet to Mile 181 above New Orleans, thence -40 feet to Baton Rouge. The channels are well marked. Southwest Pass, the westernmost of the passes of the Mississippi, is 18 nmi west-southwest of South Pass Entrance and 295 nmi east of Galveston The pass has been improved by the construction of jetties on both sides at the entrance. Near the ends of the jetties the depths are somewhat changeable, although there appears to be deep water in the Gulf of Mexico from nearly every direction up to within 2 nmi of the entrance The approach to Southwest Pass is marked by a lighted buoy that is 1.6 nmi south from the jetty ends. From the buoy to abreast of Southwest Pass Entrance Light, the channel is marked by lighted buoys on the west side of the channel and by a lighted range. Other lighted ranges continue upstream from the first range. Lights marking the channel are off some of the spur dikes extending channelward from along the inner bulkhead of the jetties.

Based on the Captain of the Port security measures, a moving safety zone occurs on the Lower Mississippi River from the Huey P. Long Bridge (Mile 106 1) to the Industrial Canal (Mile 92 7). This moving safety zone will provide a 100-foot buffer zone around passenger cruise ships and all vessels and tows carrying any of the following cargo: ammonium nitrate (solid), LNG, liquefied petroleum gas (LPG), chlorine, anhydrous ammonia, ethylamine, methylamine, vinyl chloride monomer, hydrogen fluoride, or hydrogen peroxide (note this area is more populated than the location of the proposed FLNG Terminal). Vessels that fit into these categories must notify the Vessel Traffic Center ([VTC] at 504-589-2780 or on VHF-FM Channel 67) 3 hours in advance of entering the safety zone.

The lower Mississippi River extends from the Sea Buoy at Southwest Pass and South Pass to Mile 233.0 at the U S Highway 190 Bridge, above Head of Passes, and the Mississippi River Gulf Outlet. Additional reporting requirements are imposed on all oceangoing vessels transiting within the designated safety zone.

Other than Venice, no residential development near the Mississippi River exists along the coast from the Gulf of Mexico to the proposed facility. The Venice Port Complex, which has serviced the oil and gas industry for more than 60 years, would have traffic entering the Mississippi River, but the Port itself is not directly on the Mississippi River.

With exception of the east side of Venice, Louisiana, the developed areas lie outside the Sandia Zones calculated using the Sandia National Laboratories criteria for LNG releases over water for large LNGCs (Sandia National Laboratories 2008). A detailed discussion of the Sandia Zones is included in Resource Report 11.

FLNG Vessel Movement During Weather Events

The FLNG vessels would be able to move to safe waters during a significant weather event. The FLNG vessels would be able to transit a speed of 12 knots per hour and would have eight dedicated ocean-going tugs for support.

Plaquemines Parish and south Louisiana, in general is in the hurricane belt, and the absence of sheltered facilities and anchorages, render it a poor hurricane haven. It is recommended that deep-draft vessels evade at sea when threatened by hurricane force winds (greater than 63 knots). Early threat assessment is absolutely essential due to the distance that must be traveled to reach open water (as much as 135 nmi) for vessels in New Orleans, but only (26 nmi from the Terminal location) with the limited number of evasion routes in the Gulf of Mexico.

As stated in the Coast Guard Maritime Hurricane Contingency Port Plan, when the Port is threatened by hurricane force winds and severe storm surge, the recommended course of action for all seaworthy vessels is evasion at sea. Departure to sea should commence well before the expected arrival of hurricane force winds. A late departure could endanger lives, the Port, or the environment. Vessels will not be permitted to move (including shifting berthing) during the 12-hour period immediately prior to the predicted arrival of gale force winds without the prior approval of the Captain of the Port (COTP).

As discussed in the MSC Surge Detachment Hurricane Operations Plan, the ships layberthed in New Orleans, including Plaquemine Parish are particularly vulnerable Each ship is maintained in a 96-hour Reduced Operating Status (ROS). Based upon ship hurricane sortie experience to date, approximately 36 to 48 hours are required for a ship to activate and get underway for a sortie, not including the transit time from the layberth to the sea buoy. Transit time is about 2.5 hours for terminal and a minimum lead time of approximately 12 hours is desired for maneuvering at sea in advance of the storm. Therefore, the decision to activate the FLNG vessels for a hurricane must occur about 2 0 days prior for the FLNG vessels being layberthed in terminal during a significant weather event.

The Atlantic hurricane season extends from 1 June through 30 November, with August and September being the major threat months. The principal threat to Plaquemines Parish is from tropical cyclones approaching from the southeast, south, or southwest. A total of 82% of all tropical cyclones entering the 180 nmi critical area in the 119-year period of 1886 through 2004 approached from these directions.

History has demonstrated that the hurricane season poses a real and serious threat to marine activities in the Plaquemines Parish area. The area has been affected by tropical cyclone activity at an average frequency of 1 2 events per year. A total of 45 of the 138 storms passing within 180 nmi of the area over the 119-year period 1886 to 2004 had at least hurricane intensity at their closest point of approach. Note that 57 of the 138 tracks of previous tropical cyclones did not extend back 72 hours It is recommended that all ships evade at sea at the earliest opportunity when threatened by a tropical cyclone.

Pig Launcher and Receiver

Although the incoming gas is specified as pipeline quality, it is possible that some liquids and particulates may accumulate within the header pipeline over time as a result of transient operating conditions. As the possibility of liquid accumulation in the header pipeline is deemed to be low, the main purpose of the pig launcher and receiver is to allow for periodic inspection of the header pipeline.

Inlet Bulk Separation

In the event that pipeline pigging does result in liquid slugs entering the FLNG terminal facilities, a bulk inlet separator would allow the majority of this liquid to be removed and sent to the closed drains system. Inlet bulk separation would reduce the loads on the compressor suction vessels and help minimize the potential for free liquid carryover to downstream equipment.

Feed Gas Metering and Compression

Each of the gas transmission pipeline connections would be passed through a metering station, which will consist of dual, Fiscal Standard, and Ultrasonic Flow meters configured as duty/standby with a single chromatograph analyzer monitoring the gas quality. This metering system would also be installed at the outlet of the gas treatment plant prior to the inlet of each high-pressure gas arm before the gas is transferred to the FLNG vessels.

Compression would be installed within the onshore facilities to ensure that incoming pipeline gas would be at the pressure required for the pre-treatment process. As the gas gains heat during compression, water-cooled shell and tube exchangers would cool the gas to a suitable temperature for entry into the pre-treatment plant. Preliminary FEED-level compression horsepower requirements are included in Resource Report 13.

Cold Vent/Flare

In order to ground flare facilitate the safe de-inventory of hydrocarbon gas when required, both a cold vent and a ground flare would be installed. The purpose of the cold vent would be to allow the rapid depressurization of the FLNG facilities in an emergency scenario. The ground flare system would be used when controlled depressurization is required (e.g., for maintenance). This operation can take place over a prolonged period of time, with the flare used to minimize the atmospheric emission of flammable gas.

1.2.4 Pipeline Header System

CE would construct and operate an approximately 37-mile-long, 42-inch-diameter natural gas pipeline header system, metering, and appurtenant facilities (Figure 1-4). The pipeline would extend from an interconnection of Tennessee Pipeline Tailgate 6, and extend in a southeast direction to Olga before heading south to the CE FLNG Terminal. The pipeline would also cross the Mississippi River near Baptist Collete Bayou and extend under the Mississippi River, crossing just above Venice. The pipeline would then connect to the Targa Venice Plant with interconnections to TETCO, GulfSouth, and CGT pipelines. The majority of the pipeline route is along existing canal corridors crossing through wetlands and open water. The exact details of the route are in development and will be provided in CE's filing of its application with the FERC. An overview of the current pipeline route is provided in Appendix 1-A, as well as a series of corridor maps. Pipeline design will take into account the following:

Figure 1-4. CE Pipeline Route

GSRC

May 2013

- Independent operation, flow/pressure control and shutdown of individual tie-in laterals
- Compression as required to meet onshore facilities delivery specifications
- Independent analysis and custody transfer metering of individual tie-in laterals
- The requirement and existing availability of utility services

The route of the pipeline would make it feasible to interconnect with up to six existing natural gas pipeline systems in Plaquemines Parish, Louisiana. Interconnection with these six pipelines would make it possible to transport up to 2.0 Bcf/d of domestic natural gas to the FLNG Terminal. The natural gas heat content averages about 1,015 British thermal units through the system. CE would be responsible for securing supply from upstream sources and arranging transportation through one or more of these pipelines It is likely that in some cases, laterals would be necessary for interconnections to the existing pipelines; however, the exact details would be determined as agreements are finalized with the respective pipeline companies. If lateral pipelines are required, information on these facilities will be included in the final version of Resource Report 1. The pipeline companies whose facilities the Project pipeline would potentially interconnect with include:

- Tennessee Gas Pipeline Company;
- High Point Gas Transmission (HPGT)
- Gulf South;
- TETCO;
- Columbia Gulf Transmission (CGT)
- Venice Processing;
- Texas Eastern Transmission.

CE is in the process of negotiating with the potential interconnecting pipeline companies. At this time, no agreements have been secured, but discussions are ongoing. Agreements with the potential interconnecting companies would determine the capacity of interconnecting pipelines, and if pipeline laterals are required, the location of the laterals and the resulting impacts and mitigation measures If laterals are required, CE will provide the required information and associated analysis for the laterals in the final resource reports with its application to the FERC.

1.3 LAND REQUIREMENTS

The FLNG terminal facilities would be located on approximately 125 acres of property, which should provide sufficient space during construction. It is anticipated that the pipeline construction right-of-way would be 100 feet in width and the operational right-of-way would be 50 feet in width, respectively. The temporary and permanent requirements of each Project component are being evaluated and assessed for potential impacts This information will be provided in the final resource reports with CE's application to the FERC. Pipeline components would be installed by dredging wetlands or water bottoms

1.4 FIELD SURVEYS

A remote sensing survey for marine archaeological resources in the area of the marine facilities is being conducted. The findings of the survey will be described in Resource Report 4.

Civil and environmental surveys are scheduled for the second and third quarters of 2013. CE is in the process of obtaining landowner agreements for all necessary survey work. CE will

notify all landowners prior to the commencement of surveys per the conditions set forth in each individual landowner agreement. Landowners along the pipeline right-of-way have been informed about the Project.

A wetlands mitigation site (Coastal Use Permit Number P20030160 and USACE Permit Number EG-20-030-1179) is located at the location for the proposed FLNG terminal. Additional information concerning the wetlands mitigation site and proposed additional mitigation for impacts on the mitigation site from dredging and FLNG terminal construction will be described in Resources Report 2.

1.5 CONSTRUCTION SCHEDULE AND PROCEDURES

1.5.1 Project Schedule

CE intends to request that the FERC issue authorization to site, construct, and operate the CE FLNG LNG Project no later than December 2015. Shortly after authorization to proceed, CE will begin final design and construction of the first FLNG vessel. CE anticipates requesting authorization to commence construction approximately 1 month after FERC authorization. Construction is anticipated to require approximately 44 to 48 months, with the Project in service by March 2018. Table 1-1 provides additional detail for construction of each Project component. Construction and operation of the Project is anticipated to require approximately 1,000 workers for construction and 200 workers for operation. A more detailed discussion of the anticipated construction workforce is included in Resource Report 5 - Socioeconomics.

Table 1-1. Construction Schedule for Major Components of the CE FLNG LNG Project

Project Component	Commence Construction	Complete Construction
Marine Facilities	January 2015	March 2017
Pipeline	January 2015	March 2017
FLNG Vessels	January 2015	March 2018

[1] The FLNG vessels would be constructed off-site. Time frames included in this schedule include on-site commissioning only.

1.5.2 Construction Procedures

LNG Terminal Design Requirements

The FLNG vessels would be constructed at an overseas shipyard and would transit to Plaquemines Parish for installation. As part of the classification society's review of the proposed Project, classification society surveyors would observe construction of the FLNG vessels in the shipyard and inspect production of key components of the FLNG, including hull materials, generators, and other heavy equipment, to verify that the FLNG vessels is constructed in accordance with classification society rules. In accordance with International Maritime Organization requirements (particularly the International Convention for the Control and Management of Ships' Ballast Water and Sediments), the FLNG vessels would exchange ballast prior to entering the Mississippi River. The ballast exchange would take place at least 200 nmi from the nearest land, in waters with a depth of at least 200 meters, and would require the exchange of 95% of the ballast water. This would avoid introducing foreign species that may be present in the FLNG vessels ballast water into the Mississippi River. The International Maritime Organization may institute more stringent requirements for the control of invasive organisms in ballast water as part of their International Convention for the Control and Management of Ships' Ballast Water and Sediments.

FLNG Vessels 1 and 2 would be designed and constructed in accordance with classification society rules that govern the following:

- Classification of a floating offshore installation at a fixed location;
- Construction and classification of ships for the carriage of liquefied gases in bulk; and
- Rules and regulations for the classification of ships.

FLNG Terminal Fabrication and Installation

The Project would be constructed in accordance with applicable governmental regulations, permits, and approvals Construction methods would be those that are consistent with industry-recognized practices, company policies, and best management practices. Detailed descriptions of construction methods would be prepared in construction specifications and drawings prior to the commencement of work. The FLNG vessels would be constructed in a shipyard in China and then transit to the site for installation. Although onshore LNG terminals are designed and constructed in accordance with DOT's "Liquefied Natural Gas Facilities: Federal Safety Standards" (49 CFR 193) and the National Fire Protection Association (NFPA) "Standards for the Production, Storage, and Handling of LNG" (NFPA 59A), these standards do not directly apply to an FLNG terminal, which is a floating structure. Those portions of 49 CFR 193 that apply to the design, construction, and operation of the FLNG terminal would be evaluated by the classification society in its certification review of the proposed Project. The engineering design review will be conducted by the USCG and FERC. In addition all fabrication and installation would be in accordance with the following standards.

- American Petroleum Institute, Recommended Practice 14C "*Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface Safety Systems on Offshore Production Platforms*"
- *Guide for Building and Classing Facilities on Offshore Installations*", ABS, January 2009.
- American Society of Mechanical Engineers (ASME), "*Boiler and Pressure Vessel Code".*
- ASME, "*B 31.3 Process Piping".*
- ASME, "*B 31.5 Refrigeration Piping".*
- ASME, "*B 31.8 Gas Transmission and Distribution Piping Systems".*

Project Construction

The remaining marine facilities', onshore facilities', and pipeline construction would be performed in accordance with the FERC staff's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan) and the Wetland and Waterbody Construction and Mitigation Procedures (Procedures). CE would also develop an SPCCP and a stormwater pollution prevention plan (SWPPP). The SPCCP and SWPPP and any additional best management practices will be developed after impacts from the Project have been assessed. CE will provide mitigation measures in the final resource reports with its application to the FERC.

CE would be represented on the Project site during construction by a Project Manager. Supervisors and inspectors, including the Environmental Inspector (EI), would assist the Project Manager. All inspectors and supervisors would have access to the relevant compliance specifications and other documents contained in the construction contracts To ensure that environmental conditions associated with permits or authorizations are satisfied, the EI(s) duties would be consistent with those contained in paragraph III.B (Responsibilities of the Environmental Inspector) of the FERC staff's Plan. The EI(s) would have authority to stop work or require other corrective action(s) to achieve environmental compliance. The duties of the EIs

would also include training Project personnel about environmental requirements and reporting compliance status to the contractors, CE, the FERC, and other agencies, as required.

CE would develop and implement an environmental compliance, training, and inspection program during construction of the Project to ensure all construction personnel are aware of environmental permit requirements. The program would be consistent with compliance and training requirements in the FERC staff's Plan and Procedures, and be designed to ensure that construction personnel receive environmental training appropriate to their task before they begin work, adequate training records are kept, and refresher training is provided as needed. The details of this program are largely dependent on Project-specific permit conditions and the final design of Project facilities. This program would be submitted to the FERC prior to commencement of construction activities.

Temporary Support Facilities

It is anticipated that the construction office and onshore facilities contractor staging areas would be located at the Venice Port Complex.

The following is a description of general construction procedures for each major Project component.

Marine Facilities

Construction of the marine facilities largely consists of in-water work. Figure 1-5 shows a detail of the LNG terminal facilities' layout. Figure 1-6 shows an artist's rendition of the marine facilities. A summary of construction procedures for each component of the marine facilities follows.

Dredging and Reclamation

The first operation to create the LNG terminal facilities would be the dredging of the berthing pockets and turning basin. CE is in the process of finalizing the design of the berthing pockets and turning basin. Preliminary dredging volumes have been calculated during FEED. These preliminary volumes are included in Resource Report 13. Final volumes would be determined during the detailed design stage of the Project. In addition to determining the volume of dredged material, CE would determine the need to assess impacts with regard to turbidity, sedimentation, direction of movement of disturbed materials, and displacement of contaminated materials. The results of the investigation will be provided in Resource Reports 2 and 7 with CE's application to the FERC.

Dredged material disposal would be in accordance with the USACE permit and approved dredged material management plan. CE would continue to work with the USACE and the Plaquemines Parish Government regarding the Beneficial Use and Marsh Creation Program. The dredged material management plan prepared for the Project is included in Appendix 1-D. Modifications would be provided in the final Resource Report 1 with CE's application to the FERC. Berms would be formed on the perimeter of the proposed land reclamation areas and dredged material would be pumped the short distance into the berms. The land would be built in layers and cells to promote hydraulic draining and compaction of fill material. The perimeter of the reclaimed area would be profiled to a 1-to-3 slope and protected with anti-erosion matting. Steel piles would be driven for nearshore 'dead men' dolphins, and dolphin tops would be constructed from reinforced, *in situ* concrete.

Figure 1-5. Layout of Marine Facilities

To be Provided with Final

Figure 1-6. Artists Rendition

To be Provided with Final

Jetty

Steel tubular piles would be driven into the nearshore berthing pocket sloping surrounds, for jetty piers and bridges. Pile driving activities would likely occur 24 hours per day until pile driving activities are completed At this time, geotechnical studies to characterize the sub-bottom have not been completed and the type of hammer to be used to drive piles has not been identified. Until the hammer type has been selected, impacts related to pile driving cannot be assessed with any degree of accuracy. CE is working to select the type of hammer best suited for this work and will provide this information and any associated impacts and mitigation in final Resource Report 1 and other appropriate resource reports with its application to the FERC. Precast and *in situ* reinforced concrete beams and slabs would be formed on and around the steel piles with reinforced concrete sockets cast into the piles. The top surface of the pier deck would be laid to falls with non-slip finish. Fenders would be secured to the pier face. Service towers and gas arms would be erected and bolted to the pier deck. The pier deck and bridge edges would have barriers erected.

FLNG Vessel

The FLNG vessels would be constructed in a shipyard in China. The FLNG vessels would be brought to the Project site. No construction activities for the FLNG vessels would take place at the Project site.

Pipeline Header System

CE would construct the pipeline in accordance with the FERC staff's Plan and Procedures. CE would also adhere to all additional, applicable Federal and state regulations and industry standards The pipeline would cross numerous roads, railroads, existing pipelines, and waterbodies. Approximately 26 miles (90%) of the pipeline would be adjacent to existing utility rights-of-way or corridors. The pipeline is still in the engineering phase, and waterbody crossings and existing utility corridor rights-of-way near the pipeline will be provided in the final Resource Report 1; however, a description of standard pipeline construction techniques, including those in sensitive areas, is provided below.

Right-of-Way Survey

CE would follow existing pipeline routes which provide the Project right-of-way and entry access. The first step of the rights-of-way survey would be to contact all affected landowners and notify them of the presence of the survey crews. All notifications would be made in accordance with each landowner's agreement with CE. Prior to preparing the rights-of-way for construction, civil surveys would be conducted and the pipeline centerline and outside limits of the construction workspace would be marked with stakes. Crews would also mark utility line crossings, pipeline crossings, highway and railroad crossings, sensitive resource area boundaries, and any temporary extra workspace, such as lay down areas or at stream crossings. The "One Call" system would be utilized to verify all utility crossings.

CE has identified a preliminary right-of-way that reduces environmental impacts and impacts on landowners, to the extent practicable. The right-of-way largely follows the route previously reviewed and approved for the old SONAT pipeline system, now HGT, and Union Gas Systems, running under the Mississippi River to the Venice Gathering Systems. Affected landowners have been identified and contacted with information regarding the Project. CE will continue to work with affected landowners to identify and address further concerns regarding the proposed right-of-way.

Vegetation Clearing and Grading

It is anticipated that limited clearing will be required along the pipeline. All clearing would be performed in accordance with the FERC staff's Plan and Procedures. The pipeline right-of-way would be cleared to the limits of the construction work space as outlined on the alignment sheets. Clearing crews would not be permitted to venture outside of the identified construction right-of-way without the specific permission of the landowner and the FERC.

Brush and slash would be stacked or chipped. All stumps would be disposed of to the satisfaction of the landowner and/or applicable regulations When feasible, vegetation would be cut to ground level only, leaving the root systems intact.

If fences (barbed wire, chain link, or other) are encountered along the construction right-of-way, the fence would be removed and temporary gates installed. Crews would take care to ensure that no damage occurs to other portions of the fence or wall These temporary fences and/or gates would remain closed at all times except as required for construction purposes.

Trench Excavation

To bury the pipeline underground, it would be necessary to excavate a trench. The trench would be excavated with a track-mounted backhoe or similar equipment in land areas, and my mechanical dredging in wetland and water areas. A trench would be excavated to the appropriate depth to allow for the burial of the pipe with a minimum of 3.0 feet of cover as required by 49 Code of Federal Regulations (CFR) Part 192 of the U.S. Department of Transportation's (DOT) regulations. Generally, the trench would be excavated at least 12 inches wider than the diameter of the pipe. The sides of the trench would be sloped with the top of the trench up to 12 feet across, or more, depending upon the stability of the native soils. Excavated soils would typically be stockpiled along the right-of-way on the side of the trench (the "spoil" side) away from the construction traffic and pipe assembly area (the "working" side). Where the route is co-located adjacent to an existing pipeline or utility, the spoil would be placed on the same side of the trench as the existing pipeline or utility. If it becomes necessary to remove water from the trench, it would be pumped to a well-vegetated upland area (where practical) off the right-of-way and/or filtered through a filter bag or dewatering structure constructed from hay bales or similar siltation control device.

Stringing

Following excavation of the trench, stringing of the pipeline along the trench would proceed. Pipe sections would be procured and protected with an epoxy coating applied at the factory or at a coating yard (the beveled ends will be left uncoated for welding) prior to transport to pipe yards. The pipe sections would be transported to the right-of-way boat and barge from the pipe yard. The pipe sections would be placed along the excavated trench in a single, continuous line, easily accessible to the construction personnel on the working side of the trench, typically opposite the spoil side. This would allow for welding into continuous lengths known as strings

Bending

The pipe would be delivered to the pipe yards and subsequently to the right-of-way in straight sections. In areas where natural grade changes occur or where direction changes occur, bending of the pipe or the use of fittings may be required. A qualified bending engineer would survey the trench to determine the location and amount of each field bend and then the appropriate bends would be made with a hydraulic pipe-bending machine in the field prior to welding.

Welding and Pipe Assembly

Pipe sections would be placed on temporary supports adjacent to the trench and the pipe bevels would be cleaned and aligned. The beveled ends would then be welded using a full penetration weld Welders and welding procedures would be qualified according to applicable American Society for Mechanical Engineers, American Petroleum Institute (API) Standard No. 1104, and 49 CFR Part 192 Standards.

Nondestructive Weld Inspection and Repair

All welds would be visually inspected and tested for structural integrity consistent with 49 CFR Part 192 of the USDOT's regulations. Radiographs or ultrasonic images would be taken and processed on-site for real-time results in accordance with API Standard 1104. All welds that do not meet API Standard 1104 due to slag inclusions, void spaces, or other defects would be marked for repair or replacement.

Coating Inspection and Repair

Following welding, after welds have been inspected and approved, the previously uncoated weld areas would be field-coated with epoxy. The pipe coating would be inspected using equipment that emits an electrical charge, since pipeline coatings are electrically insulating. All coating would be inspected and any defects discovered will be repaired prior to lowering.

Lowering In

Prior to lowering the pipe string, the trench would be inspected for any debris that may damage the pipe and/or dewatered Once the pipe string has been inspected and is confirmed to be in accordance with all applicable standards, the completed section of pipe would be lifted off the temporary supports and lowered into the trench by side-boom tractors or equivalent equipment. Concrete-coated pipe or concrete weights would be used if required for negative buoyancy in areas of saturated soils.

Tie-Ins

Once the pipe strings have been lowered in, a tie-in crew would make the final welds in the trench. The ends of each pipe string would be welded together, inspected, and coated.

Padding and Backfilling

Bladed equipment or backhoes would push the previously excavated material over the pipe. The subsoil material would be placed into the trench first, followed by the topsoil. If some material is not found to be suitable, additional material may be brought in from off-site. Following backfilling in agricultural land, grassland, and open land, or in specified areas, a small crown may be left to account for any future soil settling that might occur. Excess soil would be distributed evenly on the right-of-way, only in upland areas, while maintaining existing contours, and would be in accordance with landowner and agency requirements. All areas would be inspected for potential compaction and appropriate measures will be taken, if necessary.

Wetland Construction Methods

Crossing of jurisdictional wetlands would be done in accordance with the FERC staff's Procedures, as well as applicable Federal and State of Louisiana permits. The construction right-of-way would be limited to a maximum of 75 feet in wetlands, unless otherwise approved by the FERC. Operation of construction equipment in wetlands would be limited to that needed to clear the right-of-way, dig the trench, fabricate the pipe, install the pipe, backfill the trench, and restore the right-of-way.

Segregated topsoil would be placed in the trench following subsoil backfilling. Restoration and monitoring of wetland crossings would be conducted in accordance with the FERC's Procedures to ensure successful wetland revegetation. In accordance with the FERC's Procedures, fuel would not be stored within 100 feet of wetlands or other waterbodies.

Waterbody Construction Methods

All waterbodies would be crossed in accordance with the FERC's Procedures. Intermediate waterbodies (between 10 and 100 feet wide at water's edge) and minor waterbodies (less than 10 feet wide at water's edge) would likely be crossed by the open-cut/conventional lay or dry ditch crossing methods. Agricultural swales, ditches, and other such crossings would be crossed using either a wet-crossing technique if water is flowing at the time of crossing or BMPs as determined by the EI if there is no flow at the time of crossing. In accordance with the FERC's Procedures, the duration of construction would be limited to 24 hours across minor waterbodies and 48 hours across intermediate waterbodies. At no time would construction equipment be permitted to enter a waterbody unless necessary for installation of the pipeline or construction of temporary crossings necessary for access to other portions of the right-of-way.

Construction methods at waterbody crossings would vary with the characteristics of the waterbody encountered and would be performed consistent with permit conditions outlined in the regulatory permit approvals Pipe would be installed to provide a minimum of 3 0 feet of cover from the waterbody bottom to the top of the pipeline Trench spoil would be placed on the bank above the high water mark for use as backfill Following pipe installation, waterbody bed and bank contours wouldl be restored to pre-construction conditions and the banks would be stabilized as soon as possible following construction activities. Permanent erosion control structures would be installed in accordance with the FERC's Plan and Procedures, and temporary erosion control measures would be maintained to minimize erosion. The following construction, and waterbody crossing methods would be used:

(a) Dam and Pump Crossing Method

The dam and pump method involves installation of temporary dams upstream and downstream of the proposed waterbody crossing The temporary dams would typically be constructed using sandbags and plastic sheeting. Following dam installation, appropriately sized pumps would be used to dewater and transport the stream flow around the construction work area and trench. Intake screens would be installed at the pump inlets to prevent entrainment of aquatic life, and energy dissipating devices would be installed at the pump discharge point to minimize erosion and stream bed scour. Trench excavation and pipeline installation then would commence through the dewatered portion of the waterbody channel. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the temporary dams would be removed, and flow through the construction work area would be restored.

(b) Flume Crossing Method

The flume crossing method consists of temporarily directing the flow of water through one or more flume pipes placed over the area to be excavated. This method allows for excavation of the pipe trench across the waterbody completely underneath the flume pipes without disruption of water flow in the stream Stream flow would be diverted through the flumes by constructing two bulkheads, using sand bags or plastic dams to direct the stream flow through the flume pipes. Following completion of pipeline installation, backfill of the trench, and restoration of stream banks, the bulkheads and flume pipes would be removed. This crossing method

generally minimizes the duration of downstream turbidity by allowing excavation of the pipeline trench under relatively dry conditions.

(c) Horizontal Bore Crossing Method

To complete a horizontal bore, two pits would be excavated on each side of the feature to be bored. A boring machine would be lowered into one pit, and a horizontal hole would be bored to a diameter equal to the diameter of the pipe (or casing, if required) at the depth of the pipeline installation. The pipeline section and/or casing would then be pushed through the bore to the opposite pit. If additional pipeline sections are required to span the length of the bore, they would be welded to the first section of the pipeline in the bore pit before being pushed through the bore. This method could be utilized where waterbodies are directly adjacent to roads or railroads, or for elevated channelized waterbodies such as irrigation ditches.

(d) Open-Cut Crossing Method

An open-cut waterbody crossing would be conducted using methods similar to conventional upland open- cut trenching. The open-cut construction method would involve excavation of the pipeline trench across the waterbody, installation of a prefabricated segment of pipeline, and backfilling of the trench with native material. No effort would be made to isolate the stream flow from the construction activities. Depending upon the width of the crossing and the reach of the excavating equipment, excavation, and backfilling of the trench would generally be accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. If necessary for reach, the equipment may operate within the waterbody. Equipment in the waterbody would be limited to that needed to complete the crossing. All other construction equipment would cross the waterbody using equipment bridges, unless otherwise allowed by the FERC's Procedures for minor waterbody crossings.

(e) Horizontal Directional Drill

HDD is a pipeline construction method that allows for trenchless construction by drilling a hole and pulling the pipeline through it rather than digging a trench. In this manner, this construction method avoids or minimizes impact on the ground surface. The HDD method is initiated by drilling a pilot hole under the area to be crossed and enlarging it sufficiently to accommodate the pipeline to be installed

Generally, electric-grid guide wires are hand-laid across the land surface along the pipeline right-of-way crossing location to help guide the drill bit along the predetermined HDD route. In thickly vegetated areas, a swath approximately 2 to 3 feet wide may be cut across the land surface using hand tools to lay these electric-grid guide wires, resulting in minimal ground and vegetation disturbance. No large-diameter trees would be cut to accomplish guide wire installation. Following guide wire installation, a directional drilling rig would be set up and a small-diameter pilot hole would be drilled along a prescribed profile.

Electromagnetic sensors located on the tip of the drill bit would follow an electromagnetic field created by the guide wires along the prescribed path. Where guide wires cannot be used, bit tip positioning sensors would be used to guide the drill bit. In either case, once the pilot hole is completed, it would be enlarged using reaming tools to provide access for the pipe The reaming tools would be attached to the drill string at the exit point of the pilot hole and then rotated and drawn back to the drilling rig, thus progressively enlarging the pilot hole with each

pass. During this process, drilling fluid consisting of bentonite clay and water would be continuously pumped into the hole to remove cuttings and maintain the integrity of the hole. Once the hole has been sufficiently enlarged, a prefabricated segment of pipe would be attached behind the reaming tool on the exit side of the crossing and pulled back through the drill hole to the drill rig, completing the crossing.

Although HDD is a proven technology for pipe installation, any HDD installation can fail for a number of reasons, including encountering soil conditions not conducive to boring, caving of the borehole, loss of the drill string in the borehole, loss of circulation, and pullback refusal. Many of these potential failures can be avoided or mitigated by making appropriate adjustments to the operation of the HDD equipment If that fails to correct the problem, the borehole can usually be moved to another, adjacent location. Prior to construction, CE would develop a HDD Contingency Plan that would address the potential for HDD failure. The HDD Contingency Plan would provide guidance on the determination of an HDD failure, alternate crossing methods in the event of an HDD failure, and the prevention, detection, required notifications, and response to inadvertent returns.

Rugged Topography
Project topography consists of flat, rural areas. No rugged topography would be encountered along the pipeline route.

Residential Areas
CE would identify all residences within 50 feet of the pipeline. Site-specific plans would be developed for those residents that occur within 25 feet of the pipeline. If construction requires the removal of private property features, such as gates or fences, the landowner or tenant would be notified prior to the action. Following completion of major construction, the property would be restored to preexisting conditions or to landowner specifications.

Typical Construction in Commercial and Industrial Areas
CE would develop agreements with owners of commercial and industrial areas that may be crossed by the pipeline.

Active Cropland
No active croplands are anticipated to be crossed by the proposed pipeline. However, if active cropland occurs in the pipeline corridor, a maximum of 12 inches of topsoil would be segregated in actively cultivated or rotated agricultural lands, pastures, and hayfields, unless agreed upon by the landowner, in accordance with the FERC's Plan. Where topsoil is less than 12 inches deep, the actual depth of the topsoil would be removed and segregated. After laying the pipe the trench would be backfilled with a minimum of 3.0 feet of cover. Any drain tiles damaged during construction of the pipeline would be repaired to pre-construction conditions.

Road and Railroad Crossings
All crossings would be open-cut, bored, or installed by HDD, depending upon site-specific conditions and state and local statutes. Regardless of the crossing technique, road and railroad crossings and home access would be maintained continuously using provisions such as steel plates or alternate access to minimize inconvenience to the public. If a crossing would require extensive time for installation, provisions would be made to alleviate traffic (i.e , detour or re-routes). At the point that the right-of-way enters a paved surface from an unpaved area, a stone pad would be installed as a construction entrance to control mud and dirt tracking onto the highway or paved surface.

The pipeline would be buried to a depth of at least 3.0 feet below the road surface, and 10 feet below the rail of the railroad, and would be designed to withstand anticipated external loadings.

Typical Foreign Pipeline Crossings

The pipeline route would cross a number of existing foreign pipelines along its route For the majority of the crossings the new pipeline would be installed under the existing pipeline to maintain the existing cover of the existing pipelines. Excavated spoil and construction equipment would not be placed over existing pipelines to prevent potential damage.

Prior to construction, surveys would be conducted to positively identify all foreign pipeline crossings. The "One Call" system would be used to verify these crossings. Through discussions with each of the foreign pipeline's operators, CE would further develop measures to safely cross each foreign pipeline.

Blasting

It is not anticipated that blasting would be required for construction of the pipeline. Should blasting be required, a blasting plan would be developed in accordance with all regulations and industry standards.

Cleaning, Hydrostatic Testing, and Start-Up

Following the completion of pipeline construction, it would be internally cleaned with pigs (i.e., pipeline inspection gauges). A manifold would be installed on one end of a long pipeline section and pigs would be propelled by compressed air through the pipeline and into an open pig catcher. The pigs would remove any dirt, water, or debris that inadvertently collected within the pipeline during the construction process.

Following cleaning, controls and safety devices such as the emergency shutdown system, relief valves, gas and fire detection facilities, and other safety devices would be thoroughly checked and tested Once it is determined that all safety devices are functioning properly, the pipeline would be hydrostatically tested to ensure its integrity for the intended service and operating pressure. Water would be used to hydrostatically test the pipeline. The water would be pumped from the water source into the pipeline and would propel a pig through the pipeline in a manner that fills the pipeline with water. A high-pressure pump would be used to add water to the test section and to increase the test pressure At the completion of the hydrostatic test, the pressure would be removed from the test section by propelling the pig with air and dewatering the pipe. Additional "drying" pig runs would be made, as necessary, to remove any residual water from the pipeline. CE is in the process of identifying sources and discharge locations for hydrostatic test water and detailed hydrostatic test procedures. This information will be provided in the final Resource Report 1 with CE's application to the FERC.

Aboveground Facilities

CE is still in the process of evaluating aboveground facilities necessary for the pipeline. Information on aboveground facilities will be provided in the final Resource Report 1 with CE's application to the FERC.

Final Cleanup and Stabilization

Post-construction restoration activities would be undertaken in accordance with the measures specified in the FERC's Plan and Procedures, as applicable After all construction activities have been completed, the disturbed areas would be finish-graded and the construction debris disposed of properly. All grading would be completed to match original contours and to be

compatible with surrounding drainage patterns, except at those locations where permanent changes in drainage would be required to prevent erosion, scour, and possible exposure of the pipeline. In agricultural areas, the segregated topsoil would be returned to its original horizon, unless otherwise requested by the landowner. Temporary and permanent erosion and sediment control measures, including silt fencing, diversion terraces, and vegetation, would be installed at that time. Private and public property, such as fences, gates, driveways, and roads that have been disturbed by the pipeline construction would be restored to original or better condition.

1.6 OPERATION AND MAINTENANCE PROCEDURES

The Project would be operated and maintained by appropriately trained and licensed employees and contracted entities, in accordance with applicable statutes and regulations, regulatory permit conditions and authorizations, engineering design specifications, recommended manufacturer maintenance practices, and Project operating policies and procedures. Operation of the Project would be supported from a land-based office facility located within the FLNG terminal site. The estimated number of permanent Project operation and maintenance staff required would be provided in Resource Report 5. CE maintains procedures for the operation and maintenance of its facilities. These procedures are designed to ensure the effective conduct of operations, as well as to ensure reliability and availability of its assets. These documented procedures are proprietary and confidential in nature, largely due to the unique nature of our facilities. The key components of operation for each of these activities are described in the following sections.

LNG Terminal

If the CE FLNG Project is authorized and if the U S. Coast Guard (USCG) provides a Letter of Recommendation indicating that the waterways are suitable for the Project, the USCG would establish a safety and security zone around the LNG terminal This zone would extend approximately 500 yards (0.30 mile) from the center of the MS. Only Project-related vessels would be allowed within this zone unless given specific exemption by the USCG. Exported LNG would be obtained from liquefaction. FLNG vessels 1 and 2 would be transported round the world for delivery by LNGCs Upon arrival at the FLNG terminal, each LNGC would dock at the berthing area along the starboard side of the FLNG terminal, attach to the FLNG terminal's loading arms, and transfer LNG from the FLNG terminal's storage tanks. LNG would be transferred at a maximum rate of 10,000 m^3 per hour per arm One of the transfer arms would return vapor to the LNGC in order to maintain a gas atmosphere and prevent air intrusion. Side-shell water curtains would operate on both the FLNG terminal and the LNGC during all LNG transfer operations From the storage tanks on the FLNG terminal, LNG would be transferred by in-tank submersible pumps to a series of vaporizers, and then through the send-out lines and riser pipeline and into the subsea pipeline. As the LNG is unloaded, ballast water would be taken on to compensate for the weight of the unloaded cargo (see Section 1.1.5 for additional information). After completion of cargo transfer, the unloading arms and umbilicals would be detached, and the LNGC would depart with tug assistance. The entire unloading process from ship arrival to departure would take approximately 25 hours. Tugs would escort LNGCs to the FLNG terminal, with the number of tugs to be determined by the USCG. These tugs would be constructed at an overseas shipyard and would be based at a Venice Port Complex facility to be located in Venice, Louisiana. The tugs would be equipped with firefighting equipment and would provide support in the event of a fire on the FLNG terminal or an LNGC, or a pool fire on the water. Three or four tugs would assist with LNGC berthing, with the number of tugs determined by the size of the carrier, the season of the year, and weather conditions. If the

Project is implemented, the USCG would require that two tugs remain within the safety and security zone during LNG loading to assist if the FLNG terminal mooring system fails, if needed.

After completion of construction and prior to commissioning of the FLNG vessels, a ship classification society would review the results of construction surveys and CE FLNG's proposed operation procedures before issuing a class certification for the FLNG. Currently, American Bureau of Shipping (ABS) is the proposed ship classification society that would conduct the review. Further, while in service, the FLNG terminal would be subject to a regular schedule of operations surveys that would be carried out onboard the FLNG terminal to verify that the FLNG terminal continues to meet class requirements. In addition, the FLNG terminal would be subject to joint inspection by the USCG and the FERC. Once the FLNG terminal is operational, The EPAct authorizes the state commission to conduct safety inspections and provide notice of any violations for appropriate action by the FERC.

Approximately 200 full-time workers would be employed to operate the Project. The majority of these workers would operate the FLNG terminal, working in shifts of 40 hours on and 40 hours off Approximately 50 full-time workers would conduct a variety of support activities. All operations and maintenance personnel at the FLNG terminal would be trained to properly and safely perform their assignments. The terminal operators would be trained in LNG safety, cryogenic operations, and proper operation of respective terminal control equipment. The operators would meet all the training requirements of the USCG and other applicable regulatory entities.

During final design, CE FLNG would develop maintenance plans for the FLNG terminal and MS. Although the details are not available, CE FLNG anticipates that the maintenance program would include visual inspections, operational checks and tests, routine onboard mechanical and electrical maintenance activities, lubrication schedules and regular steelwork examinations, and surveys above and below the water line. Underwater maintenance may include surface cleaning of the hull and other parts to remove localized accumulations of slime and weeds. The cleaning would be accomplished by divers and would consist of light brushings conducted no more than once per year. If mechanical repairs to underwater parts of the FLNG terminal or MS are necessary, the area to be repaired would be segregated from seawater by a cofferdam installed by divers. CE FLNG does not plan to recoat underwater portions of either the FLNG terminal or MS as a part of its maintenance program CE would be responsible for maintenance dredging. CE FLNG terminal would maintain a full-time maintenance staff to perform routine maintenance and minor overhauls at the FLNG terminal. Major overhauls and major maintenance activities would be handled by trained and qualified contract personnel, and would be scheduled using a computerized database system. Unscheduled maintenance activities would be identified and tracked by the same database. The maintenance database would address all facility components, including process equipment, safety and environmental equipment, and instrumentation. CE FLNG would train all facility operations and maintenance personnel on the use of the database.

Pipeline and Associated Facilities

The pipeline facilities would be operated and maintained in accordance with 49 CFR 192. Section 3.10 6 discusses the DOT's safety regulations and requirements for natural gas pipelines and describes how CE would meet these requirements. The pipeline would be operated at an Maximum Allowable Operating Pressure (MAOP) of less than 1,440 psig. The nominal flow would be approximately 1.0 Bcfd, with a maximum flow of 1.25 Bcfd. Operation of the pipeline, including maintenance of gas quality and volumetric control, would be handled from

the CE FLNG command and control center. CE would construct minor gas quality monitoring and control facilities at existing CE Pipeline locations, using blanket construction authorizations. This equipment would include gas chromatographs and other monitoring equipment and heating equipment. The CE FLNG command and control facility and the control facilities – both of which would be manned 24 hours per day – would monitor the pipeline facilities using supervisory control and data acquisition systems. Operation and maintenance records would be maintained in accordance with the requirements of 49 CFR Part 192. Regular pipeline maintenance would include maintenance and pigging at intervals specified in CE FLNG's Project-specific pipeline maintenance plan, which would be based on regulatory requirements of the FERC, and Louisiana Department of Natural Resources regulations for pipelines, and as conditions warrant. Pigging procedures would be carried out using methods similar to those used during hydrostatic testing of the pipeline (see Section 1.6.2.3), and typically would be completed in 10 to 14 days, depending on weather and the type of inspection required. Where necessary, concrete mats or other protective barriers covering the receiver flange at the pipeline tie-in would be temporarily removed prior to pigging and later replaced, using a dive support vessel. The pipeline would be equipped with an automatic and manual shutdown system that would be implemented if a pipeline leak, equipment failure, or system failure occurred.

LNG Carriers

Regulatory Control

The Project is designed to handle LNGCs ranging in capacity from 125,000 m^3 to 170,000 m^3 (Q Flex). The maximum number of LNGC trips per year is dependent upon the capacity of the LNGCs. However, it is anticipated that between 80 and 130 LNGCs would call on the LNG terminal facilities per year. The LNGC port time (time alongside the FLNG vessel) is assumed to be between 18 and 30 hours dependent on the LNGC capacity. The estimated total pilot time for both transits in and out is 3 to 4 hours.

LNGCs must comply with all Federal and international standards regarding LNG shipping. Although LNG vessels and their operation are directly related to use of the FLNG terminal, they are not subject to the Section 3 authorization sought in CE FLNG's application to FERC. The carriers would, however, be subject to all rules, regulations, and requirements of the USCG.

The USCG would issue a Letter of Recommendation after the final EIS is issued. Project approval would require that the Letter of Recommendation finds that the waterways are suitable for the Project, with or without additional measures beyond those proposed by CE FLNG. If additional measures are included in the Letter of Recommendation, they would be incorporated into a Vessel Management and Emergency Plan. Much of the information likely to be included in the Letter of Recommendation is included in the USCG's Waterway Suitability Report (WSR).

The WSR includes pre-arrival notifications, scheduling, Mississippi River transits, escorts, marine operations, cargo transfer operations, USCG inspection and monitoring activities, and emergency operations. In addition, the USCG would establish a safety and security zone around each incoming and outbound LNGC that could extend 500 yards in front of the vessel, and 500 yards behind the vessel, or greater.

LNG Carrier Routes

LNGCs arriving and departing from the FLNG terminal would use the Mississippi River. The proposed CE FLNG facility is to be constructed on the East Bank of the Mississippi River, between mile markers 11.0 and 13.0 (Figure 1-7) An LNGC's transit to and from FLNG terminal would follow a route through the Southwest Pass (see Figure 1-3). The Crescent River

Figure 1-7. CE FLNG LNG Project General Location Map

GSRC

May 2013

Pilot would board at the Pilot Station just beyond Head of Passes. This is virtually the same route as currently used by all deep-draft vessels servicing the Mississippi River.

The CE FLNG Project would have additional onshore support facilities required for operation of the FLNG terminal and the pipeline Permanent onshore support facilities would be established at the existing Venice Port Complex, in Venice, Louisiana These facilities would include office space for 6 to 10 staff; dock space for berthing eight tugs; a workshop for tug maintenance; and a waterfront staging area capable of supporting container transfer cranes, large trucks, and a personnel transfer and boarding area.

1.6.1 Commissioning

Following completion of construction, but prior to the start of standard operation, the Project must be commissioned. The commissioning process would focus on key activities pertinent to commissioning of the Project. This process would provide necessary time to successfully complete all pre-commissioning activities, commissioning, and completion works to be performed at the Project incorporating all requirements of vendors, regulatory agencies, and Port operations.

The Project is still in the FEED phase. Once the final design has been completed, CE would develop commissioning procedures for the Project. These procedures will be filed with the FERC in the final Resource Report 1 included with CE's application to FERC.

1.6.2 LNG Terminal Facilities

Maintenance

As part of the USACE permit for the marine facilities, CE would work with the USACE and the Plaquemines Parish Government to develop a Dredging Maintenance Plan. The Dredging Maintenance Plan will be provided in the final Resource Report 1 with CE's application to the FERC.

Water Use

A description of water use by the FLNG terminal will be included in the final Resource Report 1 included with CE's application to the FERC.

LNGCs

While loading LNG at the FLNG terminal, LNGCs would discharge ballast to maintain a constant draft. LNGCs loading at the FLNG terminal would also need cooling water for the engines that generate electrical power for the onboard systems. The USCG requires that ships' engines are powered up while at dock; therefore, there would be cooling water needs during the entire time each LNGC is alongside the FLNG vessel. The LNGC port time (time alongside the FLNG vessel) is assumed to be between 18 and 30 hours dependent on LNGC size and the amount of LNG remaining on board.

Estimates for unloading LNGC water consumption (for LNG import terminals) are derived from two sources; the Jordan Cove FEIS (FERC 2009) and the Broadwater LNG FEIS (FERC 2008). The Jordan Cove FEIS estimated a range of cooling water intakes, with a low of 1,250 m^3/hr based on diesel engine vessels using some shore power. The Broadwater EIS (FERC 2008) used the highest value of approximately 9,800 m^3/hr. However, it should be noted that unloading LNGCs have higher water consumption than will a receiving LNGC for an LNG export terminal. Additional discussion of seawater use by LNGCs will be included in the final Resource Report 2 with CE's application to the FERC.

Ballast Water Regulations

The LNGCs loading cargo at the FLNG terminal would comply with International Maritime Organization (IMO) standards for ballast water management, as well as U.S. ballast water regulations contained in the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 as amended by the National Invasive Species Act of 1996 Below is a summary of USCG guidelines for implementing the provisions of the U.S. ballast water regulations that apply to all vessels operating in U.S. waters.

- Avoid ballast operations in or near marine sanctuaries, marine preserves, marine parks, or coral reefs.
- Avoid taking on ballast water:
  - with harmful organisms and pathogens, such as toxic algal blooms;
  - near sewage outfalls;
  - near dredging operations;
  - where tidal flushing is poor or when a tidal stream is known to be more turbid;
  - in darkness when organisms may rise up in the water column; and
  - in shallow water or where propellers may stir up the sediment.
- Clean ballast tanks regularly
- Discharge minimal amounts of ballast water in coastal and internal waters.
- Rinse anchors during retrieval to remove organisms and sediments at their place of origin.
- Remove fouling organisms from hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, state, and Federal regulations
- Maintain a vessel-specific ballast water management plan
- Train vessel personnel in ballast water management and treatment procedures

Additional guidelines, mandatory reporting, and record-keeping exist for all vessels entering the waters of the U.S. after operating beyond the Exclusive Economic Zones (EEZ) of the U S. and Canada. The USCG issued regulations that require ballast water management practices for all vessels entering the EEZ, after operating on waters beyond the EEZ. These guidelines are voluntary for all vessels that carry ballast water into the waters of the U S. after operating beyond the EEZ, but mandatory for vessels entering the Great Lakes and the Hudson River.

- Exchange ballast water beyond the EEZ, from an area more than 200 nmi from any shore and in waters more than 2,000 meters in depth.
- Retain the ballast water on board the vessel.
- Use an alternative environmentally sound method of ballast water management that has been approved in advance by the Commandant of the USCG.
- Discharge ballast water to an approved reception facility; or exchange ballast water in other waters recommended by the Aquatic Nuisance Species Task Force and approved by the USCG Captain of the Port.

The USCG ballast water management guidelines also include reporting and record keeping requirements. The ship master, owner and operator, person in charge, or vessel agent must send a signed copy of the following information to the USCG, and copies of this information must be maintained on board the vessel for at least 2 years.

- Ballast water management plan, if implemented?

- Copy of IMO guidelines
- Vessel's name, type, IMO number, flag, owner, gross tonnage, call sign, and agent
- Last port, next port, arrival port, and date
- Total volume of ballast water capacity
- Total volume of ballast water on board
- Total number of tanks in ballast
- Total number of tanks on board that are used for ballast, will be discharged, have undergone exchange, or have undergone alternative management
- Location, date, volume, and temperature of ballast when each tank was loaded
- Location, date, volume, and salinity of ballast water to be discharged for each tank
- Particulars of exchange if conducted, including volume exchanged, location, date, percent of tank volume exchanged, and sea height at time of exchange
- Description of alternative management method, if used
- Reasons if no ballast treatment method was used

Before vessels bound for U.S ports other than the Great Lakes or the Hudson River north of the George Washington Bridge depart from the first port of call in the waters of the U.S , they must send the above information by one of the following methods·

Mail to:

USCG
c/o Smithsonian Environmental Research Center
P.O. Box 28
Edgewater, MD 21037-0028

Transmit electronically to:

National Ballast Information Clearinghouse at www.serc si.edu invasions ballast htm

Fax to:

Commandant, USCG c/o the NBIC
Fax no. (301) 261-4319

Handling and Disposal of Hazardous Materials

The process of feed gas pre-treatment and natural gas liquefaction would require storage and disposal of certain hazardous materials.

Feed gas pretreatment from the amine system would remove hydrogen sulfide and carbon dioxide from the pipeline quality gas prior to transfer to the FLNG vessels. Hydrocarbon heavies would be removed from the feed gas on the FLNG vessel and transferred to a hydrocarbon condensate storage tank within the onshore facilities. At regular intervals the condensate from the storage tank would be offloaded to road tankers to control the inventory in the storage tank. Mercury removed from feed gas would be collected in a vessel on site. It is expected that the volume of mercury removed over the life of the project would be extremely small and that the mercury storage vessel would not need to be emptied for the life of the project.

Aboveground Facilities

CE is still in the process of evaluating aboveground facilities necessary for the pipeline. Information on aboveground facilities will be provided in the final Resource Report 1 with CE's application to the FERC.

Final Cleanup and Stabilization

Post-construction restoration activities would be undertaken in accordance with the measures specified in the FERC's Plan and Procedures as applicable. After all construction activities have been completed, the disturbed areas would be finish-graded and the construction debris disposed of properly All grading would be completed to match original contours and to be compatible with surrounding drainage patterns, except at those locations where permanent changes in drainage would be required to prevent erosion, scour, and possible exposure of the pipeline. In agricultural areas, the segregated topsoil would be returned to its original horizon, unless otherwise requested by the landowner. Temporary and permanent erosion and sediment control measures, including silt fencing, diversion terraces, and vegetation, would be installed at that time. Private and public property, such as fences, gates, driveways, and roads that have been disturbed by the pipeline construction would be restored to original or better condition.

The USCG ballast water management guidelines also include reporting and record keeping requirements. The ship master, owner and operator, person in charge, or vessel agent must send a signed copy of the following information to the USCG, and copies of this information must be maintained on board the vessel for at least 2 years.

- Ballast water management plan; has it been implemented?
- Copy of IMO guidelines;
- Vessel's name, type, IMO number, flag, owner, gross tonnage, call sign, and agent;
- Last port, next port, arrival port, and date;
- Total volume of ballast water capacity;
- Total volume of ballast water on board;
- Total number of tanks in ballast;
- Total number of tanks on board that are used for ballast, will be discharged, have undergone exchange, or have undergone alternative management;
- Location, date, volume, and temperature of ballast when each tank was loaded;
- Location, date, volume, and salinity of ballast water to be discharged for each tank;
- Particulars of exchange if conducted, including volume exchanged, location, date, percent of tank volume exchanged, and sea height at time of exchange;
- Description of alternative management method, if used; and
- Reasons if no ballast treatment method was used.

Before vessels bound for U.S. ports other than the Great Lakes or the Hudson River north of the George Washington Bridge depart from the first port of call in the waters of the U.S., they must send the above information by one of the following methods:

1.7 SAFETY AND SECURITY

On March 5, 2013, CE provided a Preliminary Waterway Suitability Assessment (WSA) and Letter of Intent to the USCG CE will continue to work with the USCG in the development of the follow-on WSA. Additional safety measures relating to the onshore facilities and the pipeline will be identified after the FEED process has been completed. CE will describe these measures in the final Resource Report 1 included with CE's application to the FERC.

1.8 FUTURE PLANS AND ABANDONMENT

CE presently has no plans for expansion of the CE FLNG LNG Project. If future circumstances merit an expansion or modification of the CE FLNG LNG Project, CE would obtain all necessary permits and approvals prior to such expansion or modification. At the end of the useful life of the Project facilities, CE will obtain the necessary approval to abandon its facilities in accordance with applicable regulations and any landowner requirements. However, CE has no current plans for abandonment of the CE FLNG LNG Project

1.9 PERMITS AND APPROVALS

CE will apply for all necessary permits, clearances, and licenses relating to the construction and operation of the Project. Table 1-2 provides a list of major permits and approvals that CE must obtain for the Project. CE has begun consultation with the agencies for each respective permit or approval (Appendix 1-C). CE will file with the FERC copies of agency responses to information requests, and responses to commute.

1.10 AFFECTED LANDOWNERS

CE has contacted landowners in accordance with 18 CFR § 157.21(f)(3) and 18 CFR § 157.6(d). A list of affected landowners is presented in Appendix 1-B. CE will continue to communicate with landowners throughout the Project.

In addition to the directly affected landowners, other stakeholders will have either a regulatory jurisdiction or interest in the Project. Federal and state agencies with permitting, review, or consultation authority are addressed in Section 1.9. As discussed in its Request to Initiate the FERC Pre-filing Process, CE has conducted agency consultations and begun a public outreach process intended to inform potentially interested stakeholders about the Project and provide an opportunity for feedback about the Project or potential concerns. Prior to submitting its request to the FERC to initiate the FERC's formal Pre-Filing Process, CE notified Federal and state permitting agencies of the Project and CE's intent to initiate the Pre-Filing Process (see November 5, 2012, Letter, Docket No. PF13-1-000, at Tables 1 and 2). CE has continued to consult with respective agencies to request review and approval of field survey and sampling plans, and to advance the development of other Federal and state permit applications.

An open house is being held in Buras, Louisiana, at the Buras Auditorium, on June 10, 2013. The open house is an opportunity for interested stakeholders to learn about the Project and ask questions in an informal setting. Invitations were mailed to local officials, landowners, and groups and notices were posted in public locations in the Project area.

Table 1-2. Agencies with Relevant Major Permit or Consultation Requirements

Agency	Regulation/ Authority	Permit/Approval/ Consultation	Point(s) of Contact	Notified of Intent to use Pre-Filing Process	Agency Plans to Participate in Pre-Filing Process	Anticipated Application/ Consultation Date
Federal						
DOE, Office of Fossil Energy	NGA Section 3	Authorization to Export LNG by Vessel to Free Trade Agreement (FTA) Nations	Mr John Anderson Manager, Natural Gas Regulatory Affairs U S DOE, Office of Fossil Energy, Washington, DC 20026-4375	Yes	NA	November 21, 2012
	NGA Section 3	Authorization to Export LNG by Vessel to Non-FTA Nations	Mr. John Anderson Manager, Natural Gas Regulatory Affairs U S DOE, Office of Fossil Energy, Washington, DC 20026-4375	Yes	NA	July 31, 2013
FERC	NGA Section 3	Authorization for construction and operation of liquefaction facility	Ms Lauren O'Donnell Director, Division of Gas-Environment and Engineering 888 1st Street NE Room 62-17 Washington, DC 20426	Yes	Yes	Third Quarter 2014
	NGA Section 7	Certificate for construction and operation of interstate natural gas pipeline	See above for contact	Yes	Yes	Third Quarter 2014
USCG, Dept. of Homeland Security	33 Code of Federal Regulations (CFR) 127; 2004 Interagency Agreement; NVIC 05-08	Submit Letter of Intent (LOI) and Waterway Suitability Assessment (WSA), and receive Letter of Recommendation (LOR) for suitability of waterway for LNG marine traffic.	Sector Commander Peter W. Gautier USCG Sector New Orleans Facility Compliance Branch 200 Hendee Street, New Orleans, LA 70114	Yes	Pending further consultation	March 5, 2013 (LOI and PWSA)

Table 1-2, continued

Agency	Regulation/ Authority	Permit/Approval/ Consultation	Point(s) of Contact	Notified of Intent to use Pre-Filing Process	Agency Plans to Participate in Pre-Filing Process	Anticipated Application/ Consultation Date
U S Environmental Protection Agency (EPA)	44 CFR 9	Greenhouse Gas Permit for construction and operation air emissions	Mr Brad Toups U.S EPA Region 6 1445 Ross Avenue, Suite 1200 Dallas, Texas 75202	Yes	Pending further consultation	March 25, 2013
	Clean Water Act (CWA) Section 402	National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Permit for Stormwater runoff	Dr Raul Gutierrez Wetlands Section US EPA Region 6 1445 Ross Ave Ste 1200 Dallas, Texas 75202	Yes	Yes	March 25, 2013
USACE	CWA Section 404	Section 404 Permit for impacts on waters of the U S , including wetlands	Ed Wrubluski Environmental Protection Specialist New Orleans District Regulatory Branch Eastern Evaluation Section	Yes	Pending further consultation	Fourth Quarter 2012
	CWA Section 10	Section 10 Permit for activities affecting navigation	See above for contact	Yes	See above	Fourth Quarter 2012
U S Fish & Wildlife Service	Endangered Species Act (ESA) Section 7	Consultation under Section 7 of ESA for potential impacts on Federally protected species	Mr Joshua Marceaux Endangered Species Coordinator U S Fish and Wildlife Service 646 Cajudorne Blvd, Suite 400	Yes	Pending further consultation	March 21, 2013
	Migratory Bird Act; 3/30/11 MOU for Implementation of Executive Order 13186 between FERC and FWS	Consultation regarding impacts on migratory birds	See above for contact	Yes	See above	March 21, 2013
	Fish and Wildlife Coordination Act	Consultation regarding impacts on fish and wildlife	See above for contact	Yes	See above	March 21, 2013

Table 1-2, continued

Agency	Regulation/ Authority	Permit/Approval/ Consultation	Point(s) of Contact	Notified of Intent to use Pre-Filing Process	Agency Plans to Participate in Pre-Filing Process	Anticipated Application/ Consultation Date
U S Department of Commerce, National Oceanic and Atmospheric Administration (NOAA)	ESA Section 7	Consultation under Section 7 of ESA for potential impacts on Federally protected species	Dr Richard Hartman Fishery Biologist Chief, Baton Rouge Field Office National Marine Fisheries Service Military Science Bldg Room, 266 LSU, South Stadium Drive Baton, Rouge LA 70903	Yes	Yes	March 22, 2013
National Marine Fisheries Service (NOAA Fisheries)	Marine Mammal Protection Act Section 101 (a)(5)	Consultation for potential impacts on Federally protected marine mammals, an incidental take permit is required if the project results in the take of a marine mammal	See above for contact	Yes	See above	March 22, 2013
	Fish and Wildlife Coordination Act	Consultation regarding impacts on fish and wildlife	See above for contact	Yes	See above	March 22, 2013
	Magnuson Stevens Fisheries Management Act	Consultation and receipt of conservation recommendations regarding designated Essential Fish Habitat	See above for contact	Yes	See above	March 22, 2013

1.11 NON-JURISDICTIONAL FACILITIES

CE is in preliminary design and non-jurisdictional facilities are still in the process of being identified. If non-jurisdictional facilities are identified, information on these facilities will be provided in the final Resource Report 1 included with CE's application to the FERC.

1.12 CUMULATIVE IMPACTS

Cumulative effects are the impacts on the environment resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. While there are no existing or proposed FERC or LNG-related projects in the immediate area, the lower Mississippi River has on ongoing maintenance dredging program that could impact the Project. Cumulative impacts from local and regional projects could occur on wetlands, water quality, fisheries, air quality, and Essential Fish Habitat. CE will identify projects or actions in the Project area that may contribute to cumulative effects when considered with impacts from the CE FLNG LNG Project. CE will provide an assessment of potential cumulative impacts resulting from these projects in the final Resource Report 1 included with CE's application to the FERC.

1.13 REFERENCES

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APPENDIX 1-A
PIPELINE CORRIDOR MAPS

Appendix A-1. Vicinity Map on USGS 7.5-minute Topographic Quadrangle

GSRC

May 2013

CE Pipeline Route - Map 1

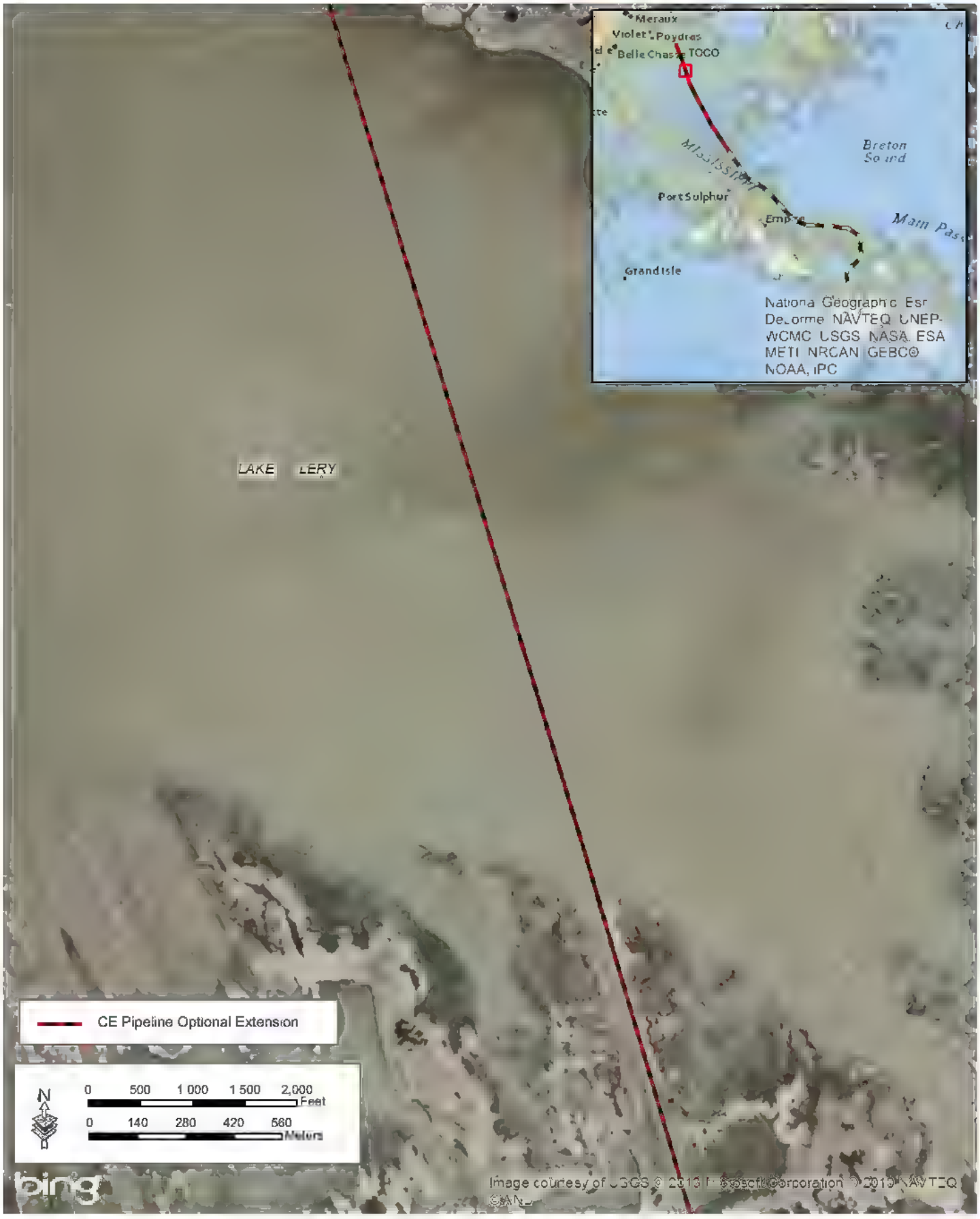
GSRC

May 2013

CE Pipeline Route - Map 2

GSRC

May 2013



CE Pipeline Route - Map 3

GSRC

May 2013

CE Pipeline Route - Map 4

GSRC

May 2013

CE Pipeline Route - Map 5

GSRC

May 2013

CE Pipeline Route - Map 6

GSRC

May 2013

CE Pipeline Route - Map 7

GSRC

May 2013

CE Pipeline Route - Map 8

GSRC

May 2013

CE Pipeline Route - Map 9

GSRC

May 2013

CE Pipeline Route - Map 10

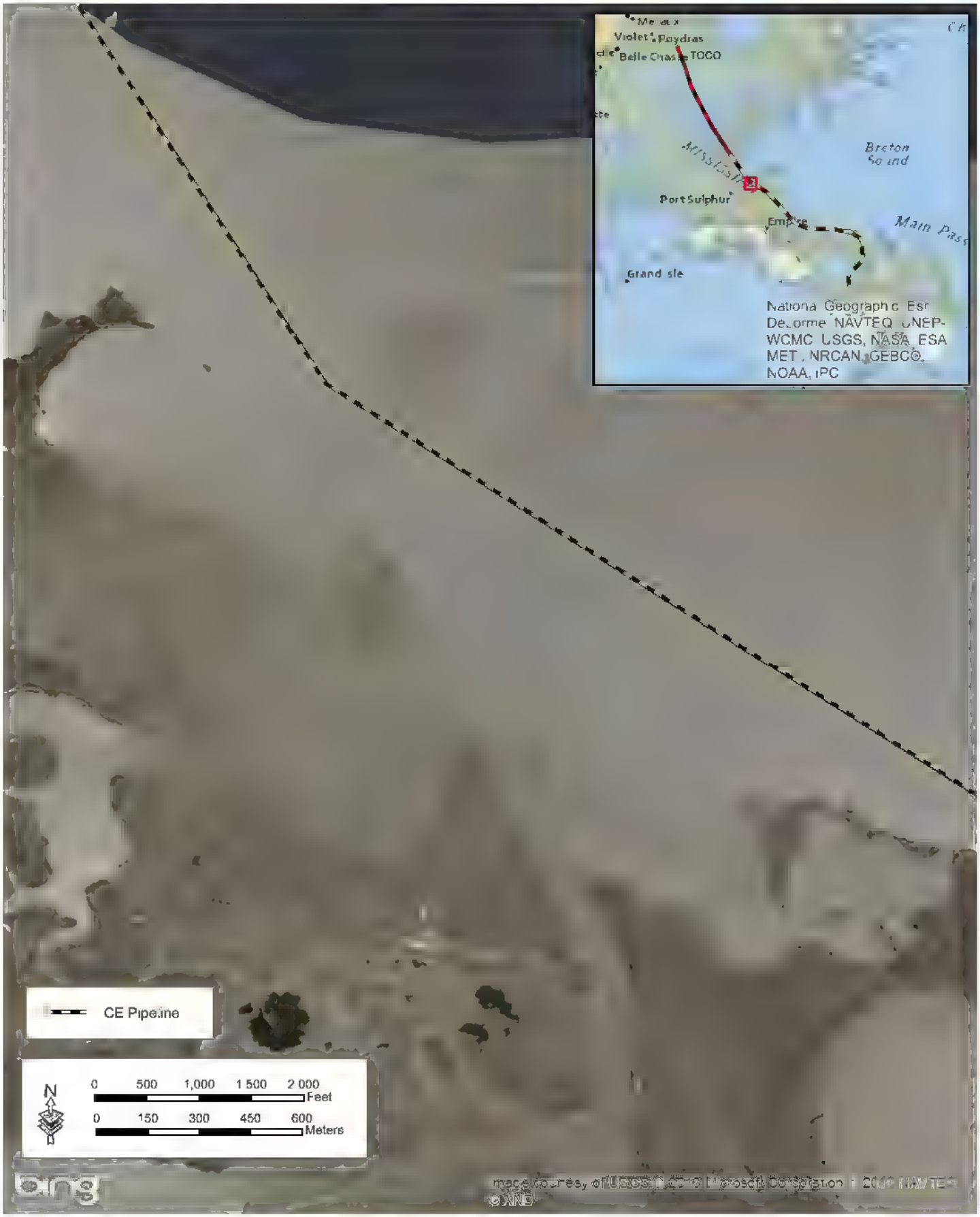
GSRC

May 2013

CE Pipeline Route - Map 11

GSRC

May 2013



CE Pipeline Route - Map 12

GSRC
May 2013

CE Pipeline Route - Map 13

GSRC

May 2013

CE Pipeline Route - Map 14

GSRC

May 2013

CE Pipeline Route - Map 15

GSRC

May 2013

CE Pipeline Route - Map 16

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May 2013

CE Pipeline Route - Map 17

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May 2013

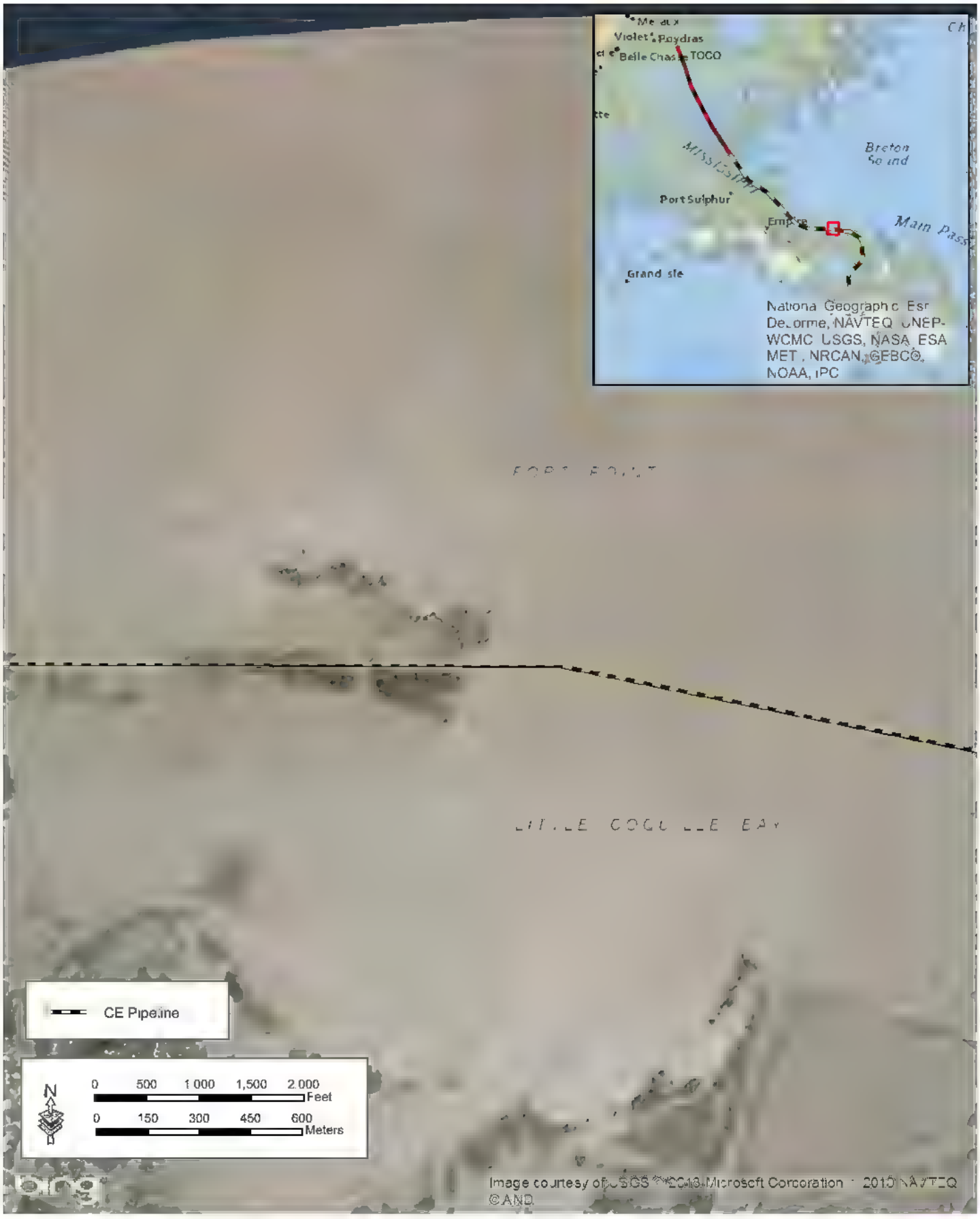
CE Pipeline Route - Map 18

GSRC
May 2013

CE Pipeline Route - Map 19

GSRC

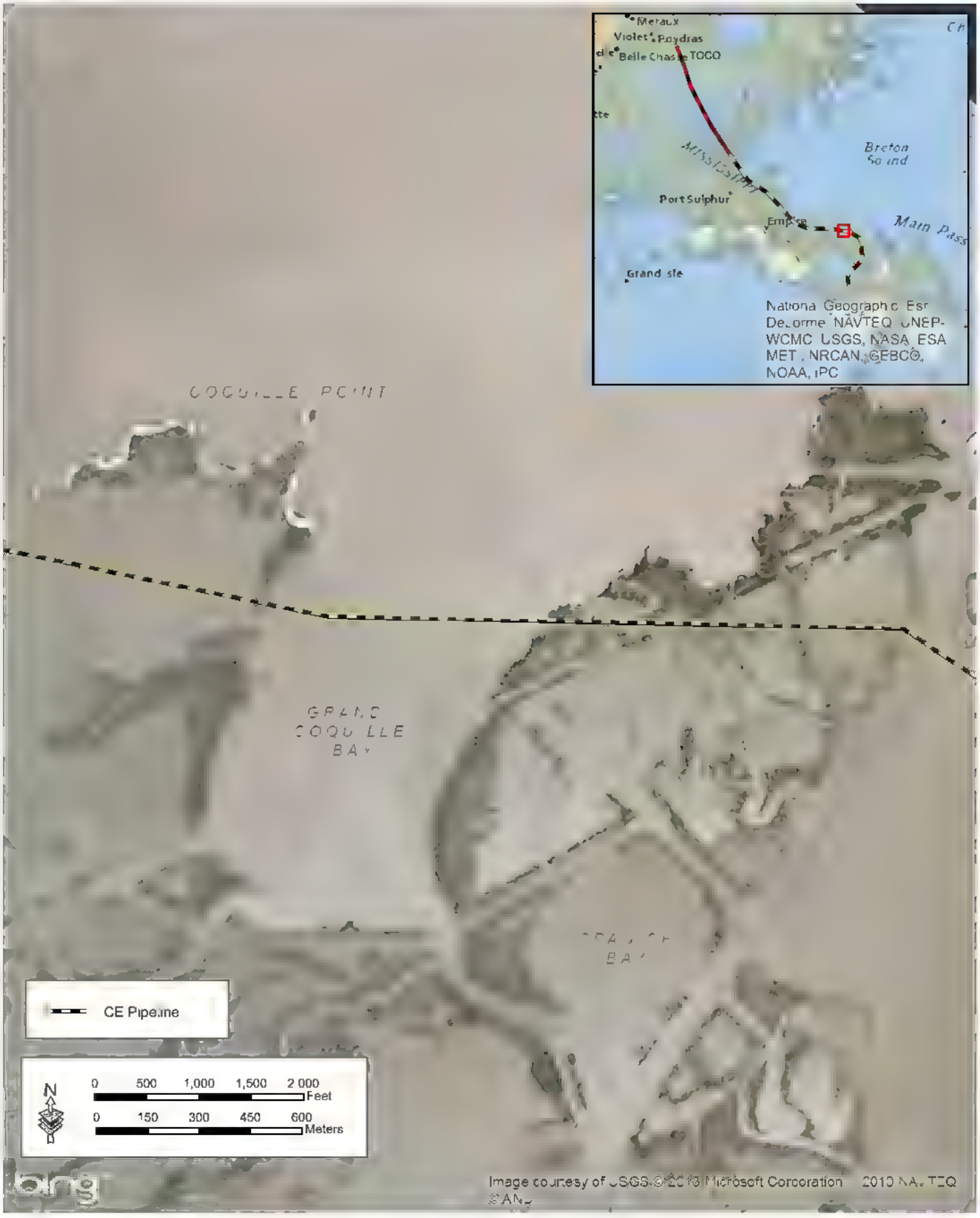
May 2013



CE Pipeline Route - Map 20

GSRC

May 2013



CE Pipeline Route - Map 21

GSRC

May 2013

CE Pipeline Route - Map 22

GSRC

May 2013

CE Pipeline Route - Map 23

GSRC

May 2013

CE Pipeline Route - Map 24

GSRC

May 2013

CE Pipeline Route - Map 25

GSRC

May 2013

CE Pipeline Route - Map 26

GSRC

May 2013

CE Pipeline Route - Map 27

GSRC

May 2013

APPENDIX 1-B
AFFECTED LANDOWNER LIST (PRIVILEGED AND CONFIDENTIAL)

APPENDIX 1-C
AGENCY CORRESPONDENCE

APPENDIX 1-D
DREDGED MATERIAL MANAGEMENT PLAN FOR MISSISSIPPI RIVER IMPROVEMENT PROJECT, 2009

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Document Content(s)